ARMY RESEARCH AND DEVELOPMENT

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Army Heart Pump Raises Development Team Hopes In Comparative Testing

Extensive testing of the Army's developmental heart pump controlled by fluid dynamics principles has demonstrated that its pulsating flow offers much better possibility of success than pumps now in use in prolonged by-pass experiments — pointing to its advantages for long-term support of blood circulation.

Results of three months of experimentation on dogs will be reported by Walter Reed Army Institute of Research (WRAIR) investigators in a forthcoming issue of an appropriate medical journal.

While pulsating flow advantages of the Army pump have been demonstrated in a way conducive to high hopes, "cautious optimism" regarding its application to military and civilian open-heart surgery, particularly for field Army use, continues to be the publicity policy of the developmental team.

Lt Col Timothy G. Barila, chief of the Department of Resuscitation, and director of the year-long course in Military Medicine and Allied Sciences, heads the WRAIR research team. Capt Martin L. Dalton, Jr., Univ. of Mississippi Medical Center, has succeeded Capt Daniel B. Dunn, who has returned to private practice, as his principal co-worker.

Kenneth E. Woodward continues to work on engineering refinements of the pump with his developmental

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Electronics R&D Laboratory 5-Man Team Gains Honors At Seventh Secretary of the Army Awards Ceremony

Secretary of the Army Cyrus R. Vance presents Outstanding Suggestion Award to USAREUR-Group James M. McCue (hidden), Heinz Medler (center), Fred Falk.

George W. Taylor (left), one of five Fort Monmouth employees, receives Special Act of Service Group Award from Secretary Vance. Lt Gen Frank Besson, Jr. sponsored presentation of the award.

Seventh Annual Secretary of the Army Awards, presented October 3, recognized five employees of the U.S. Army Electronics Research and Development Laboratory, Fort Monmouth, N.J., for an "electronic crowbar" that has saved the Government $1,685,000 on Nike Zeus system tests.

Mortimer H. Zinn, Sol Schneider and George W. Taylor each received 25 percent of a $3,735 Special Act or Service Award for their contributions toward developing the electronic device. Anthony J. Buffa was awarded 15 and Raymond W. Brower 10 percent.

A 3-man team at Headquarters, U.S. Army, Europe, shared a $3,530 award for an outstanding suggestion that "resulted in tangible benefits to the Government of $1,980,000."

Fred W. Falk, supervisory production specialist, Heinz Medler, German supervisory electronic engineer, and James M. McCue, a GS-12 physicist,

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Army Awards 2 Contracts for STINFO Assistance

Advances in implementing the massive Army-wide Scientific and Technical Information (STINFO) program in September included award of two important contracts. One is for an in-depth on-site survey of all available resources, the other for systems assistance in developing a rapid retrieval system.

All Army installations with STINFO functions are to be examined comprehensively in the on-site survey, to be finished by September 1964.

Survey teams will determine what techniques are being used in producing, processing, storing, retrieving and disseminating tech information.

Personnel, facility and equipment resources also will be analyzed, with a view to improved utilization and integration into the Army-wide system, and incorporation into the overall Department of Defense STINFO

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Featured in This Issue . . .

Army R&D Newsmagazine

Vol. 4, No. 9 October 1963

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among the widely dispersed and diffused Army R&D activities; to maintain a closer link from top management through all levels to scientists, engineers and technicians at the bench level; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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By-lined Articles: Accuracy and relevancy of contents of this publication to accomplishment of the Army R&D mission are of constant concern to the editors. Primary responsibility for opinions of by-lined authors rests with them; their views do not necessarily reflect the official policy or position of the Department of the Army.

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All other Department of the Army agencies should submit their requirements through channels to the Army Publications Distribution Center servicing them.

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Army Materiel Command Long-Range R&D Planning

By Maj Gen Britton, Director, R&D, Hq, AMC

The United States is faced with the task of providing superior weapons for application in a wide variety of military situations; at the same time it is confronted with military needs that exceed the prime resources—time, money and professional manpower. Use of these limited resources with respect to needs cannot be fully effective without clear plans for action which relate resources to objectives and requirements.

Plans cannot be drawn for achieving specific results in research as long as there is appreciable uncertainty concerning the outcome of the research. The ability to plan is increased as knowledge of the field in which R&D is to take place becomes greater in quantity and quality.

It is axiomatic that we must plan the investment of time, money and manpower in those R&D investigations that offer the greatest probability for discovering, adapting and inventing means for insuring our national survival. You cannot plan *all* research and development, but you can plan *for* R&D.

Mindful of the critical need for forward-looking planning, the USAMC adopted as one of its primary management concepts the establishment of a planning function (short-, mid- and long-range) in its Research and Development Directorate. The purpose if this planning function is to insure continuous consideration of DoD and DA planning documents in the planning and programing of our R&D activities. It seeks to produce a dynamic program responsive to top-level plans, while at the same time insuring adequate input to these same plans by furnishing technical forecasts, materiel concepts and cost estimates of R&D programs.

The inclusion of a Forecast of Scientific and Technological Advances as an annex to the Basic Army Strategic Estimate (BASE) is an indication of the importance accorded technical forecasting in the Army planning process. The Long Range Technological Forecast, reconciled and consolidated by the R&D Directorate of AMC and published by OCRD, is the primary source of this annex.

BASE, through its basic Army strategy and concepts, provides input to the Army Strategic Plan (ASP) and the Army Force Development Plan (AFDP). The ASP accounts for objective planning guidance and direction to Army R&D, and the AFDP prepares program guidance for the best utilization of available resources. The importance of imaginative and valid technological forecasting is self-evident.

Three objectives will be met as a result of AMC's long-range forecasting and planning activities for R&D:

- **We will be able to respond more quickly with appropriate technology to meet future tactical problems as they are recognized.**
- **We can focus resources on barrier problems long before they block specific weapon development.**
- **We can aid the tactician in exploiting expanding technological capabilities to the maximum.**

The adequacy of the technological forecast depends upon the ability of the scientific personnel of AMC at all echelons to keep in touch with world sciences—to interpret this knowledge of the accomplishments, interests, methods and vigor of scientific groups into estimates of the rate and direction in which technology is moving. Information about what is taking place, and where, must be collected widely and accurately.

Research and development constitute a process for innovation. It begins with unorganized lore and produces a basis for engineering and production of devices that fulfill some need of mankind. The organization created to achieve innovation can and must be intelligently managed. For AMC, the organization consists of the Headquarters R&D Directorates and the R&D installations, activities and laboratories in major subordinate commands.

The field establishments plan and perform an intricately interlocked series of tasks, combined into projects in the Army's Five-Year Force Structure and Financial Program. Beyond the 5-year period, AMC's long-range R&D technical planning requires the translating of AMC technical objectives, and the long-range objectives of AFDP, ASP and Army Long-Range R&D Plan (ALRRDP), into specific tasks.

Tasks are organized into a time-related or logical sequential plan leading to the initiation of materiel development projects to satisfy Army materiel requirements as stated in the Combat Development Objectives Guide, the AFDP, the ASP and the ALRRDP.

The AMC R&D plan is capable of revealing the need for the many research and exploratory development tasks which must be initiated and successfully completed before characteristics of specific items of materiel can

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Army Heart Pump Raises Developmental Team Hopes

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team at the Harry Diamond Laboratories in Washington, D.C. In 1962 he was awarded a Secretary of the Army Decoration for Exceptional Civilian Service to recognize his invention of the pump.

Evaluation of the pump has been in progress at seven major civilian hospitals engaged in open-heart surgery and at four military hospitals performing that type of operation.

Experiments have been conducted for periods ranging from three months to more than nine months by many of the Nation's most eminent surgeons. While findings are encouraging, results are exploratory.

In each of the experiments at Walter Reed Institute, the heart pumps performed the functions of the by-passed hearts and lungs for two hours. In each test, significant differences were recorded in the nature of pulsating versus steady flow types of pumps.

Animals sustained by the Army pump in the by-pass experiments survived longer than five days. Those sustained by the "roller" type pump now in general usage succumbed, on the average, after about four hours.

While pulsatile blood flow is not essential in short-duration heart by-pass operations, the WRAIR team believes the chance of death or major complications increases when the non-pulsating equipment is used.

In such cases, it was stated, the hearts of the test animals appear to be less capable of resuming their normal functions after the experiments are completed. Liver, kidney, brain and other vital organ complications may ensue. The more natural "heartbeat" circulation of the Army pump apparently prevents blood congestion and other possibly fatal complications.

If experiments continue to succeed (again that tone of "cautious optimism"), researchers agree on its potential application to life-saving operations in military as well as in civilian hospitals. Emphasis is on the need for many more tests before the Army heart pump is used on humans.

Still, researchers believe the lightweight, easily transportable Army pump holds encouraging prospects of someday keeping wounded soldiers alive in remote areas during critical hours after the injury.

Should future research sustain findings to date and supplement them in leading to further refinements, the developmental team is looking ahead to the day when the pump could be attached to a source of compressed air or gas and operated under battlefield conditions.

Extremely simple in construction, the pump is powered and automatically controlled by the principle of fluid amplification, one of the exciting new areas of research as applied to missile controls and many industrial requirements. (For details of construction and a technical description of its operation, see April 1962 and February 1962 issues of this publication.)

Recent modifications of the Army pump have reduced its size slightly and cut its weight almost in half—from 10.5 to 5.75 pounds. Also, a new more easily sterilized materiel is being used in its construction. Most of the standard "roller" heart pumps

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Army Awards 2 Contracts for STINFO Assistance

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program directed by Walter Carlson.

Coordinated through the Army Director of Technical Information, Col Andrew A. Aines, who is also chief of the Scientific and Technical Information Division, U.S. Army Research Office, the survey will be made with CEIR, Inc., Arlington, Va., contractor.

An On-site STINFO Survey Steering Committee will assist the contractor, as will Army personnel at the various installations with STINFO functions. The contractor is responsible for training Army personnel in the techniques that will be used in the survey.

Steering Committee membership will include representation from the Office of the Chief of Research and Development, Army Materiel Command, Combat Developments Command, Continental Army Command, Office of the Surgeon General and Office of the Chief of Engineers.

Findings to be compiled in the survey will include information on technical libraries, documentation centers, evaluation centers, primary reports production and distribution functions, primary and secondary journals, and other technical information and support activities.

Among other areas to be examined are scientific and technical symposia, including costs of conducting the meetings and travel expenses of participants. Inquiry also will be made regarding experimentation on new methods and techniques for handling STINFO and advanced training requirements for a funding program.

Other objectives are to determine information user types and their basic requirements; ascertain organizational and operational problems with a view to establishing STINFO uniform standards; and inquire into qualifications of personnel currently engaged in STINFO in order to establish job standards and rosters for organizational staffing.

Reports of a STINFO survey made in November 1961 for the U.S. Army Research Office by the Ballistics Research Laboratory at Aberdeen Proving Ground, Md., will offer a basis of comparison with findings in the new survey. The earlier survey was made under the guidance of Martin H. Weik and covered some 90 installations and activities engaged in STINFO efforts.

Contractor personnel will make initial visits to sample the nature and types of STINFO functions within the Army. Included will be the Waterways Experiment Station, Vicksburg, Miss.; Fort Belvoir, Va.; Walter Reed Army Medical Center, Washington, D.C.; Aberdeen Proving Ground, Md.; Redstone Arsenal, Ala.; Fort Monmouth, N.J.; Edgewood Arsenal, Md.; Fort Eustis, Va.; and the Quartermaster R&D Command at Natick, Mass.

SYSTEMS ASSISTANCE CONTRACT. The contract negotiated with Jonker Business Machines, Inc., of Gaithersburg, Md., provides for joint effort with the U.S. Army Research Office in developing an information retrievel system at USARO Hq.

The work will augment the recent installation of a Jonker 400 Automatic Information Input Machine and other data processing equipment at the U.S. Army Research Office. Objectives include:

- Improvement of the presently functioning USARO Reference Center by designing and installing a document indexing program in depth to provide ready access to information now stored in the Center.
- Construction of USARO Current Awareness System, also known as Selective Dissemination on Information, for incoming information.
- Development of a vocabulary descriptive of the Army research efforts. The microthesaurus is to be compatible with industrial and govmental vocabulary development.

USAPRO Briefs New R&D Chief on Human Factors Research

U.S. Army Personnel Research Office studies of man as the continuing critical factor in modern warfare—despite quantum advances in military materiel and technology—have been presented to Lt Gen William W. Dick in one of his first visits as the new Chief of Research and Development.

USAPRO was transferred from control of the Office of the Adjutant General to the Office of the Chief of Research and Development in December 1961, a few months after General Dick terminated his assignment as Deputy CRD to begin a 3-year tour as CG of the U.S. Army Air Defense Command.

USAPRO has passed through numerous name changes but has been actively engaged in personnel research, directed toward new knowledge of psychological and physiological reactions of man, since the beginning of World War II. Today the basic objective of USAPRO research is to achieve the highest possible effectiveness of Army personnel by scientific evaluation techniques.

Accompanying General Dick on his orientation tour of USAPRO were Col David G. Gauvreau, OCRD executive; Col William G. Sullivan, newly assigned as chief of the Human Factors and Operations Research Office, U.S. Army Research Office, OCRD; and Col K. C. Emerson, staff assistant for research in the Office of the Assistant Secretary of the Army (R&D).

USAPRO Commander Col Charles S. Gersoni gave the briefing. Staff leaders present included Dr. Hubert E. Brogden, chief scientist; Dr. Julius E. Uhlaner, director of the Research Laboratories; and the chiefs of the five USAPRO laboratories, Dr. Joseph Zeidner, Dr. Philip J. Bersh, Dr. Leonard V. Gordon, Edmund F. Fuchs and Cecil D. Johnson.

Col Gersoni explained that the rapidly accelerating tempo of automation and complex weapon systems development is presenting new challenges in developing advanced evaluation techniques for improved utilization of manpower.

USAPRO is continuing its historic mission of research to assess human behavior for the scientific prediction of man-to-job compatibility, that is, "fitting the man to the job," but emphasis has shifted. Modern Army requirements for highly trained technicians to man sophisticated weapon systems have led USAPRO to stress utilization research—studies of man's responses to varied combat situations and environments.

USAPRO briefs Army Chief of Research and Development. L. to R. are Col William G. Sullivan, chief of the Human Factors and Operations Research Division, USARO; Dr. Julius Uhlaner, director, Research Laboratories; Dr. Hubert Brogden, chief scientist; Lt Gen W. W. Dick, CRD; Col Charles S. Gersoni, USAPRO commander; Col David G. Gauvreau, OCRD executive.

As an example of the new approach to human factors research, Col Gersoni described the Surveillance Systems Research Project, conducted by the USAPRO Support Systems Research Laboratory. The objective is to develop computer action sequence and image interpretation techniques that will be applicable to automatic surveillance in general.

Completed research studies in image interpretation, it was stated, have served to indicate specific interpreter procedures which are expected to provide the tactical commander with combat situation information accurately and rapidly for timely use.

One of the studies, for example, has shown that two or more image interpreters working cooperatively identify more targets and with greater accuracy than when working alone. Further, it was learned that the percentage of error among image interpreters increases when scanning time is extended beyond an adequate identification period.

Another study proved that stereoscopic presentation of imagery provided no greater accuracy in identification than nonstereoscopic imagery. Still another research task of USAPRO, in cooperation with the U.S. Army Signal Research and Developmental Laboratory, is helping to develop man-machine operations in the Mobile Tactical Image Interpreter Facility.

ARTOC (automated system for receipt, processing, storage, retrieval and display of tactical information) is a Command Systems Task aimed at determining what display characteristics and operator procedures will help to provide the commander with reliable intelligence for fast decisions.

General Dick was briefed also on a USAPRO research task responsive to a wide variety of jobs which have a monitor function requiring speedy and accurate responses under fatiguing and boring conditions.

With the aid of Bureau of Standards engineers, the Combat Systems Research Laboratory has devised a Vigilometer that will aid research on fatigue and other conditions responsible for poor performance.

In the same Laboratory, the Critical Situation Task experiments are seeking to find ways of minimizing the harmful effects of critical situations in Special Forces operations. What is the range of behaviors of Special Forces personnel when an emergency occurs? What can be done to prevent performance loss or breakdown?

Results of these experiments, it is hoped, will help the Special Forces detachment leader to keep his men on the mission line when critical situations occur.

Even the tried-and-true measurement techniques used in personnel selection and classification are being put to new uses at USAPRO, Col Gersoni pointed out. Research in the Military Selection Research Laboratory is probing feasibility of programed machine testing. The possibility of using 8-item tests for Go-No Go screening is also being explored.

In accordance with Congress-legislated responsibility for providing uniform tests of mental ability for all the Armed Forces, USAPRO has re-

cently developed the seventh and eighth forms of the Armed Forces Qualification Test.

A series of studies on combat performance in the Arctic, Korea, and Germany has improved the procedures for selecting good fighters. The Behavioral Evaluation Research Laboratory has developed a Special Forces Selection Battery which has considerably increased the yield of personnel for Special Forces training.

Research has been undertaken to discover what personnel factors combine to make a good combat team. Data now coming in to USAPRO computers from the Officer Evaluation Center at Fort McClellan will help determine whether officer performance can be predicted for different kinds of assignments.

Most USAPRO research is responsive directly to the specific military requirements of military agencies. Sometimes it is possible to do a more exploratory type of study jointly with an operational study. These studies are selected so that their results will feed into a sequence of applied studies. Each USAPRO laboratory is investigating an exploratory human factors area.

Col Gersoni also informed General Dick of USAPRO's long-range research plans, geared to anticipated Army requirements of the 1970s.

A demonstration of the Optiscan Camera Eye Marker also was arranged for General Dick. This is a new device used to study visual search behavior and decision processes of image interpreters in obtaining reconnaissance information.

General Dick views demonstration of Optiscan Camera Eye Marker during USAPRO briefing by Col Gersoni, commanding officer. Project director, James Thomas points out photographic recording of test by camera.

Col Gersoni explained that in studying man-machine relationships, USAPRO has found it increasingly necessary to develop machines which help behavioral scientists find out more about human factors involved in man-machine systems.

The typical job of the image interpreter is to study aerial reconnaissance photographs and report what he finds. USAPRO has now turned the camera on the image interpreter to study precisely how he performs.

Designed by Dr. Norman Mackworth, an eminent scientist in the field of visual research, the eye-marker camera photographs what the interpreter is looking at and simultaneously records eye movements on a 35-millimeter film strip. Interpreted by USAPRO scientists, the films will provide the answers to some urgent questions on the visual search patterns of interpreters:

- In what way do the search patterns of effective image interpreters differ from the search patterns of less efficient image interpreters?
- How many "fixations" (eye pauses) are made for a correct identification as against an incorrect identification?
- How does the environmental "surround" affect the search pattern and report of the image interpreter?
- What clues does an image interpreter use in his search pattern?
- How is the eye movement pattern affected by poor-quality imagery which may be expected with electronic transmission of air-to-ground imagery under future war conditions?

Shillelagh Contracts Hit $61 Million 4-Year Total

Army funding of the Shillelagh surface-to-surface, tank-mounted missile system recently reached a total of $61 million with award of a $7 million contract to Aeronutronic Division of Philco Corp., subsidiary of Ford Motor Co.

3 Services Sponsor 3 High School Science Students in Japanese Exhibition

Three of the top high school science students in the United States will participate in the 7th Japan Student Science Awards (JSSA) in Tokyo, Nov. 5-10, under sponsorship of the Army, Air Force and Navy.

Japanese officials extended the invitation through Science Service, the American nonprofit organization that for 14 years has administered the National Science Fair-International (NSF-I).

The Japanese exhibition is sponsored by the *Yomiuri Shimbun*, one of the largest newspapers (6,500,000 circulation), which also finances the sending of Japanese students to the NSF-I in the United States.

Under the plan adopted at a recent meeting of U.S. Army, Air Force and Navy officials, each Service will select a representative student from the winners chosen by its judges at the 14th NSF-I in May 1963. The Army picked 20 students who were rewarded for their scientific achievements by a 1-week all-expense paid trip to an Army laboratory or given summer jobs in labs.

Watson Davis, director of Science Service, attended the tri-service meeting to discuss sending the students to the Japanese science fair. He indicated that he or a member of his staff may join a Japanese escort officer in accompanying the students.

Prize-winning exhibits shown by the three students at the 14th NSF-I also will be displayed at the Japanese exhibition, but will not be entered in competition for any of the awards. Each student will be responsible for crating and delivery of his exhibit to the nearest military base for shipment by Military Air Transportation Service (MATS) to Japan.

Former Director of Army Research, Maj Gen C. W. Clark, now commanding general of the U.S. Army in Japan, is expected to be on hand to welcome the students when they arrive in Tokyo. During their 5-day stay they will spend part of the time as guests of American military families stationed in Japan and then visit with a Japanese family.

In view of the expanding participation of other countries in the NSF-I, and the possibility that Sweden, Germany and other countries may follow Japan in inviting U.S. students to take part in their respective junior science fairs, U.S. project officers have considered sending students to a different fair each year.

Arrangements for the visit of the U.S. students to enter the Japanese fair are being made by Jack Fenn of the Army, Maj George Freeman of the Air Force, and Ray R. Roberts of the Navy. MATS will furnish transportation paid by the Services.

The *Yomiuri Shimbun* sponsors the Japanese student science fair in support of the National Council for the Advancement of Science Education.

USAELRDL 5-Man Team Gains Honors at SA Awards Ceremony

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shared the award for proposing IM 108 radiometer modification.

Decorations for Exceptional Civilian Service were bestowed on four men and two Meritorious Civilian Service Awards were presented.

More than 1,000 officials and employees of the Department of the Army and other Government agencies assembled in the Pentagon at Washington, D. C., to observe Secretary of the Army Cyrus R. Vance make the presentations.

Dignitaries included Under Secretary of the Army Stephen Ailes, Chairman John W. Macy of the U.S. Civil Service Commission, and Lt Gen J. L. Richardson, deputy chief of staff for personnel, who presided as host. Army Chief of Chaplains (Maj Gen) C. E. Brown, Jr., gave the invocation and the benediction. Music was furnished by the Army Band and Chorus.

The 5-man USAELRDL team was recognized earlier this year with the presentation of one of 19 Army R&D Achievement Awards, made annually by the Chief of Research and Development. "Extraordinary ingenuity and initiative in the recommendation, design, fabrication and installation of an electronic crowbar . . . for the Nike Zeus Systems" was credited to them in the citation.

Engineers won two of the Decorations for Exceptional Civilian Service. Joseph I. Boswell, whose work is in supervisory construction management with the U.S. Army Engineer District at Vicksburg, Miss., home of the Army Waterways Experiment Station, was cited for "direction of an emergency mission to recover 1,100 tons of liquified chlorine gas" from a commercial barge that sank in the Mississippi River. Press reports termed it a highly dangerous task.

"Outstanding contributions in the formulation of sound Federal policies and standards for development of the Nation's water resources" earned the DECS award for Eugene W. Weber, a GS-17 deputy director of civil works for policy. He is assigned to the Chief of Engineers, Washington, D.C.

Paul W. Davis, a GS-14 administration officer for the U. S. Army in the Ryukyu Islands, was awarded the DECS for "outstanding achievements in the implementation of the High Commissioner's People-to-People Program" in community relations.

The fourth DECS went to Harry E. Wagner for bravery in "directing and participating in the search, location and evacuation of an injured airman who had fallen over a sheer cliff to a ledge 800 feet below at a DEW line site at Cape Newenham, Alaska."

A native of the Ryukyu Islands, Hitoshi Kaneda of the U.S. Army Military Police Group security guard, was presented the Meritorious Civilian Service Award for bravery in rescuing a 4-year-old daughter of a U.S. Army captain from a pack of wild dogs.

The second MCSA went to Herman C. Tardd, Jr., a visual information officer in the Publications Division, Headquarters U.S. Army Materiel Command in Washington, D. C. The citation commended him for his technical knowledge in design and production of graphic and visual aids.

The Seventh Annual Secretary of the Army Awards recognized, for the second consecutive year, notable results of the research and development program. In 1962, four of the five top awards were made for R&D.

Top ranking invited guests inrluded: Special Assistant to the Under Secretary of the Army (Personnel) Roy K. Davenport, acting chairman of the Army Incentive Awards Board; Director of Civilian Personnel Charles F. Mullaly and his deputy, John Will;

Lt Gen William W. Dick, Chief of Research and Development, and his deputy, Maj Gen George W. Power; Lt Gen Frank S. Besson, Jr., CG of the Army Materiel Command; Lt Gen R. W. Colglazier, Deputy Chief of Staff for Logistics, and his director of installations, Maj Gen W. R. Shuler; and Maj Gen Autrey J. Maroun, director of programs, Office of the Deputy Chief of Staff for Personnel.

Undersecretary of the Army Stephen Ailes (second from left) is briefed on "Hit-Kill" indicator installed on jeep-mounted 106 mm. recoilless rifle during recent tour of U.S. Army Combat Developments Experimentation Center, Fort Ord, Calif. At left of Mr. Ailes is Maj Gen G. V. Underwood, Jr., Chief of Information; at right is Lt Col William F. Mangum, CDEC briefing officer.

Army Heart Pump Raises Development Team Hopes

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are larger than a desk and weigh hundreds of pounds.

Civilian hospitals or clinical laboratories where the Army pump models are being tested and evaluated include: Western Reserve University, Cleveland, Ohio; University of South Carolina, Charleston, S.C.; Peter Bent Brigham Hospital, Denver, Colo., and Denver General Hospital; University of Minnesota, Minneapolis, Minn.; University of Indiana Medical Center, Bloomington, Ind.; Wesley Memorial Hospital, Chicago, Ill.

In addition to Walter Reed General Hospital Thoracic Surgical Service, Army generals evaluating the artificial heart pump in continuing experiments are Letterman, San Francisco, Calif.; William Beaumont, El Paso, Tex.; Brooke, San Antonio, Tex.; and Fitzsimons, Denver, Colo.

4th Status Report on Fuel Cells Indicates Industrial Interest

Fuel Cell power source potentialities are interesting a steadily increasing number of industrial firms and nonprofit research foundations, the newly published Army *Fourth Status Report on Fuel Cells* indicates.

The comprehensive review of all known activity in fuel cell research contains reports from 38 firms and foundations. Although 44 indicated they are engaged in fuel cell investigations, six offered no report on their activities at this time. Inquiries were directed to about 100 organizations.

The *First Status Report on Fuel Cells*, compiled and edited by the U.S. Army Research Office, set an all-time record for public sales of a technical document at the Office of Technical Services, U.S. Department of Commerce.

The new report was compiled and edited by Dr. Herbert F. Hunger, one of the Army's top experts in the field and leader of the research team working on fuel cells at the U.S. Army Electronics Research and Development Laboratories Power Sources Division, Fort Monmouth, N.J. Dr. Fritz R. Franke, another eminent authority, assisted him while on duty as an Army Reservist.

Government agencies may obtain the report by addressing requests to the Commander, Defense Documentation Center, Cameron Station, Bldg. 5, Alexandria, Va. Public sales again will be handled through the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C. The AD number and price had not been set at press time.

Fuel cell research and development activity not supported by the Government was reported by the following corporations and nonprofit units:

Aerojet General Corp., a subsidiary of General Tire & Rubber Co.; AiResearch Manufacturing Co., a Division of the Garrett Corp.; Allis-Chalmers Manufacturing Co.; Allison Division, General Motors Corp.; American Cyanamid Co.; American Oil Co.; Armour Research Foundation, Illinois Institute of Technology; Astropower, Inc., a subsidiary of Douglas Aircraft Co.; Atomics International, a Division of North American Aviation, Inc.; Battelle Memorial Institute; The Electric Autolite Co.; The Electric Storage Battery Co.; Electrochimica Corp.; Engelhard Industries, Inc.; Esso Research and Engineering Co.;

General Electric Co., General Engineering Laboratory; General Scientific Corp.; Gulton Industries, Inc.; Institute of Gas Technology, affiliated with Illinois Institute of Technology; Ionics Inc.; Leesona Moos Laboratories, a Division of Leesona Corp.; Ling-Temco-Vought, Inc.; Lockheed Missiles & Space Co., a group Division of Lockheed Aircraft Corp.; Magna Corp., a subsidiary of Thompson Ramo Wooldridge, Inc.;

The Marquardt Corp.; Melpar, Inc., a subsidiary of Westinghouse Brake Co.; Monsanto Research Corp., a subsidiary of Monsanto Chemical Corp.; NRA, Inc., subsidiary of Nuclear Research Associates, Inc.; Pratt & Whitney Aircraft, Division of United Aircraft Corp.; Pure Carbon Co.; Sonotone Corp.; Speer Carbon Co.;

Surface Processes Research and Development Corp.; Texas Instruments, Inc.; Thiokol Chemical Corp.; Thompson Ramo Wooldridge, Inc., TAPCO Division; Union Carbide Corp.; and Yardney Electric Corp., Yardney International Corp.

Maj Gen Dolvin Heads U.S.-German Joint R&D For 1970s Battle Tank

Project manager responsibility for development of a new main battle tank for the 1970s has been assigned to Maj Gen Welborn G. Dolvin, U.S. Army Materiel Command, who was promoted to 2-star rank Sept. 3.

In coordinating the joint U.S. and Federal Republic of Germany developmental effort on the new tank, General Dolvin takes into the assignment knowledge and experience gained in research and development and as a combat command officer.

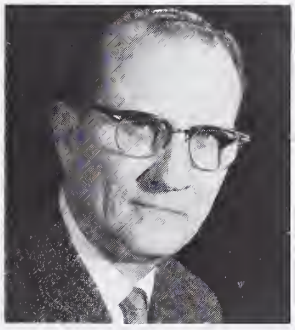
The 47-year-old general served two assignments in the Office of the Chief of Research and Development, and until recently was assistant commandant of the U.S. Army Armor School at Fort Knox, Ky. He is a highly decorated veteran of tank combat in World War II and in Korea.

Graduated from the United States Military Academy in 1939, he served with the 4th Armored Division in Germany as a combat commander during World War II. He also served on the staff of Allied Land Forces, Central Europe.

A native of Greensboro, Ga., General Dolvin was graduated from the U.S. Military Academy in 1939 and from the U.S. Army War College in 1954. His new duties will station him at Army Materiel Command Headquarters in Washington, D.C., though he will maintain a small field office at the Tank Automotive Center in Detroit, Mich.

Brig Gen Francis J. Murdoch has succeeded General Dolvin as assistant commandant of the Armor School. Until reassigned he was assistant division commander of the 7th Infantry in Korea.

Industry Advised on Microelectronics Potential



W. L. Doxey

Microelectronics potentialities for the modern Army's requirements hold a rosy future for electronics manufacturers, in the opinion of one of the Army's top experts in the field.

Acting Technical Director W. L. Doxey of the U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J., expressed his views at a Sept. 17 symposium on microelectronics sponsored by the Long Island Electronic Manufacturers Association.

In the keynote address, he predicted that microelectronics will have an increasing impact on design of field Army communications, surveillance, automatic data processing and other equipment. Miniaturization to reduce size and weight must be married to reliability and cost reduction, he said.

"Automatic data processing is simply a 'must' in the modern Army. It is required to digest the millions of bits of information in the field that must be recorded, sorted, analyzed and extracted in the combat and logistic support of combat forces."

After evaluating the different kinds of circuitry that are being used in the emerging generation of microelectronic equipment, he told industrialists:

"I would like to emphasize from the R&D point of view that we will continue to explore aggressively all of the technologies of thin films, integrated circuits and discrete parts to give the Army the new capabilities it must attain. Different kinds of circuitry will be used singularly or in hybrid structures—in a way that meets requirements on a timely, practical basis."

USAELRDL Tabs 1963 Achievement, Leadership Award Winners

Walter Govinsky

William Wade

A chemist who found an ingenious chemical solution to a major physical-electronic problem and a space engineer turned manager and diplomat have won the third annual U.S. Army Electronics Research and Development Laboratories' technical achievement and leadership awards.

The winners are William L. Wade of the Electronic Parts and Materials Division, for technical achievement, and Walter Govinsky, SYNCOM System Office, for leadership.

Selected from five nominees in each classification, they were awarded plaques citing their achievements. Laboratories Commander Col James M. Kimbrough, Jr., presented the awards at a Sept. 26 dinner in Gibbs Hall. Names of the winners also are engraved on permanent scrolls in the Laboratories' Hexagon Hq.

The other nominees who were cited in each field are: Technical achievement, Harold M. Jaffe, Surveillance Department; Edward Lieblein, Communications Department; Dr. Georg Goubau, Institute for Exploratory Research, and Joseph A. Allen, Engineering Sciences Department.

For leadership, Richard Cartwright, Engineering Sciences Department; Lt Col James A. Robertson, Office of Administration and Services; Marvin J. Lowenthal, Surveillance Department, and Robert A. Gerhold, Electronic Components Department.

WADE'S citation noted that he devised chemical techniques and processes that permit, for the first time, formation and deposition of microwave-quality thin ferrite films on any surface. The process, the citation continued, showed far superior performance over previously used bulk ferrite materials, "completely eliminating the prior physical problems of cutting and handling exceedingly thin slabs of brittle ferrite."

An Army veteran who served in both the European and Pacific theaters in World War II, Wade was born in North Bergen, N.J., and received his bachelor's degree in science from City College of New York (CCNY). A member of the American Chemical Society, he has worked in the Laboratories since 1951 and is continuing his education with courses at Seton Hall University and in the internal training program at Fort Monmouth.

GOVINSKY has been employed in the Laboratories since 1949 and has been in space engineering work since early Sputnik days. He achieved his honor in management of the organization's work on the SYNCOM synchronous communications satellite ground stations.

He was cited for "effective direction of the total USAELRDL effort in SYNCOM, directing and coordinating the efforts to 40 USAELRDL personnel, providing technical direction of contractual aspects, establishing controls for schedules and expenditures and maintaining cordial relationships with other agencies, with the result that the USAELRDL area of responsibility . . . was finished successfully on time and within budgeted fiscal limiations."

Born in New York City, he received his bachelor's degree at CCNY. He earned his master of science degree in electrical engineering at Rutgers, and is continuing graduate work there.

The other eight nominees were awarded citations at the banquet.

JAFFE, who first came to the Laboratories in 1942, was cited "for directing the design, development and flight testing of a new airborne (radio) direction-finding system that overcame obstacles which rendered earlier designs ineffective, thereby meeting an urgent operational overseas requirement of DOD-wide magnitude."

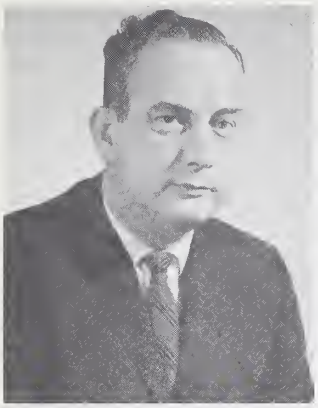
An old hand at radio direction finding, he achieved prominence when his direction finders were instrumen-

Harold M. Jaffe

Edward Lieblein

Dr. Georg Goubau

Joseph A. Allen



Richard Cartwright

Lt Col J. A. Robertson

Marvin J. Lowenthal

Robert A. Gerhold

tal in locating the first satellite. He served in the Army in the European theater during World War II and is an active amateur radio operator.

LIEBLEIN, an acknowledged expert in data processing, was named for his achievement in directing development and aiding in circuit design of two medium capacity Fieldata computers, Basicpac and Informer, so efficiently that both engineering test models could be used without modification for field tests.

Born in New York, he obtained his B.S. degree in electrical engineering at NYU and his master's in the same field at Rutgers after work at both Rutgers and Massachusetts Institute of Technology. He is a member of the Association for Computing Machinery; the Professional Group on Electronic Computers of the IEEE; the Subcommittee on Punched and Magnetic Tape of the Electronic Industires Association; and Joint Service Working Group on Small Computers, and the Military Communications Systems Technical Standards committee.

DR. GOUBAU, who achieved prominence some years ago for his surface wave transmission discoveries, was honored for "conceiving a beam waveguide at optical frequencies and designing and directing its experimental installation, which demonstrated for the first time the feasibility of long-distance transmission by light frequencies."

The IEEE Harry Diamond award was presented to Dr. Goubau for his surface wave work in 1957, and he is a Fellow of the IEEE. Born in Munich, Germany, he obtained his Ph.D. degree at the University of Munich. He came to the United States to work for the Laboratories in 1947, after working for Zeiss in Jena, Germany.

ALLEN'S technical direction enabled the Laboratories to develop an electronic counter-counter measures device permitting FM voice communications when the basic, or intelligence-bearing, signal is much weaker than interference, natural, unintentional or enemy jamming. A receiver modified with the device can be carried in a ¾-ton truck.

Born in Newberry, S.C., he obtained his B.S. degree at South Carolina State and his M.S. at Rutgers. Since coming to the Laboratories in 1949, he has worked in both the Communications and Engineering Sciences Departments. He is a member of IEEE.

CARTWRIGHT fought the weather, and won, in setting up the display portions of last year's Association of the U.S. Army symposium at Fort Monmouth. Charged with "planning, coordinating and establishment of physical facilities for the tent and dynamic displays" of the symposium, he overcame the handicap of two severe coastal storms which knocked down tents and damaged equipment.

A native of Philadelphia and a Marine at heart, he now works for the Army as if it were his original service. He lost a leg at Iwo Jima, was wounded at Saipan while with the Marines in the Pacific, and is a member of the VFW and the Fourth Marine Division Association.

LT COL ROBERTSON, deputy director of Administration and Services, was named for his successful reorganization of the USAELRDL Support Battalion into a Troop Command. The citation credited that with "resulting in a major simplification of administration and substantial reduction in overhead space requirements while at the same time making it more responsive to direction and in support of the Laboratories."

Born in Schuyler, Va., he attended the Jefferson School of Commerce in Charlottesville before entering the Army in 1941. Graduated from Signal Corps Officer Candidate School in 1942, he served in the European and Asiatic-Pacific Theaters during World War II. He has also served in the Caribbean Command and at various posts in the continental U.S.

LOWENTHAL did much to establish the Laboratories' preeminence in the meteorological field. Credited with setting up and supervising operation of two highly successful tropical weather symposia and guiding a large external program on the same subject, he also supervised an equally important internal program on low-level wind sounding and ranging.

Born in Philadelphia, he obtained his bachelor's degree from Temple University and his master's degree from the University of Pennsylvania. Before coming to Fort Monmouth he worked in the U.S. Weather Bureau in Miami and taught science and mathematics in Philadelphia high schools. In World War II, he was an Army Air Corps weather forecaster in the Southwest Pacific.

GERHOLD, long in the field of microelectronics, was cited for "leadership in all aspects of both technical and administrative direction of the micromodule engineering and supporting programs, resulting in national recognition of USAELRDL competence and leadership in this specialized area of microelectronics."

Born in New York, he received his BSEE degree from Cooper Union. Before coming to the Laboratories, he worked in the Material Laboratory of the New York Naval Shipyard. He has published over 20 papers in the field of automation, printed wiring and microelectronics. He is a member of the Industrial Electronics Committee and the Professional Technical Group on Product Engineering and Production of the IEEE.

Nike Zeus Project Leader Heads Missile Command

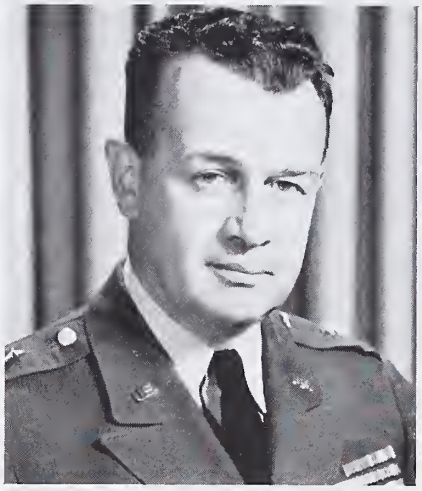
Brig Gen John G. Zierdt, who rose to national prominence as project officer and an ardent spokesman for the Army's Nike Zeus antimissile missile program, is the new commander of Army Missile Command.

Recommended by Lt Gen Frank S. Besson, Jr., CG of the U.S. Army Materiel Command, as one of the Army's most experienced officers in missile R&D, procurement and supply, General Zierdt took his new post early in September.

Brig Gen H. P. Persons, Jr., deputy CG of Air Defense Systems, who temporarily headed the Missile Command following Maj Gen Francis J. McMorow's death of a heart attack Aug. 23, will continue to lead air missile systems.

A 1937 graduate of the U.S. Military Academy, General Zierdt has been Deputy Director of Research and Development on General Besson's staff for the past year. Prior to that time, he held several key positions at Redstone Arsenal, Ala.

First assigned as chief of the Control Office, Army Ballistic Missile Agency (ABMA) at Redstone, he played a key role in development of the Jupiter intermediate range ballistic missile. In March 1958, he moved up to become Maj Gen John B. Medaris' chief of staff when the Army Ordnance Missile Command (AOMC) was formed.



Brig Gen John G. Zierdt

As deputy commander of the Army Rocket and Guided Missile Agency (ARGMA) in 1960, he took charge of the Nike Zeus development program, then moved up to command that element of AOMC in June.

When ABMA and ARGMA were abolished in reorganization of AOMC in 1961, General Zierdt was made deputy commanding general, Guided Missiles of AOMC, the predecessor to the U.S. Army Missile Command.

In his new assignment he directs more than 12,000 military and civilian personnel at Redstone and at Watertown Arsenal, with an annual budget of more than $1 billion. Other personnel of his Command are stationed at missile test sites and operational missile units throughout the Free World.

Weapons systems under his direction range in size from the shoulder fired Redeye to the 70-foot-long Redstone ballistic missile; in weight, from the 4-pound killer, the LAW, to the 5-ton Sergeant ballistic missile; in range, from small antitank weapons such as Shillelagh and TOW to the 400-mile Pershing missile.

Other systems include Nike Hercules and Hawk guided missiles air defense systems, weapons being phased out of the Army's inventory such as Nike Ajax and Corporal, those in development like the Lance ballistic missile and Mauler air defense system, and those in feasibility study such as the AADS-70 (Army Air Defense System, 1970's).

The son of a retired Army colonel, William H. Zierdt, of Grantsville, Pa., General Zierdt served in the European Theater of Operations during World War II. Post war assignments included a tour as commanding officer of Milan Arsenal, Milan, Tenn., and a 2-year tour in the Office of the Chief of Ordnance as chief of the Ammunition Branch.

A graduate of the Command and General Staff College, Fort Leavenworth, Kans., and the Army War College, Carlisle, Pa., he did post graduate work at the Massachusetts Institute of Technology.

RAC Slates November Move to New Headquarters

Relocation of the Research Analysis Corporation from Bethesda, Md., to an ultramodern new building at McLean, Va., is scheduled to begin in November, based upon the present rate of construction of facilities.

RAC President Frank A. Parker said the new headquarters, located on a 20-acre hilltop site, will provide 138,000 square feet of floor space and bring together all 16 of the research divisions. Presently they are occupying five separate buildings.

The new center is situated in the triangle bounded by the Dulles Airport Freeway, the Capital Beltway and Route 123, providing easier and much more rapid access to the Pentagon, hub of top military planning.

An independent, nonprofit research foundation responsible for the major share of Army operations research on a contract basis, RAC has a staff of 495, of whom nearly one-half are engineers and scientists.

"Because our output is almost exclusively scientific—findings, analyses, recommendations—we have attempted to create a physical plant in which scientific productivity can flourish to the greatest possible degree," Parker said.

In addition to Washington area operations, RAC maintains offices in Europe and Southwest Asia.

FY 1963 Report Reflects Over $1 Billion Savings

Cost Reduction Program savings in excess of $1 billion dollars without hampering the national security build-up are reflected in Secretary of Defense Robert S. McNamara's FY 1963 progress report.

Sound business practices, spearheaded by a changeover from cost-plus to fixed-price or incentive contracts, are effecting economies that give promise of mounting to about $4 billion dollars for the Cost Reduction Program by 1967, the report indicated.

Among defense build-up gains reported for the past 24 months are:

- A 100 percent increase in the number of nuclear warheads in the strategic alert forces.
- A 60 percent increase in the tactical nuclear forces deployed in Western Europe.
- A 45 percent increase in the number of combat-ready Army divisions.
- A 30 percent increase in the number of tactical air squadrons.
- A 60 percent increase in airlift capability.
- A 100 percent increase in ship construction and conversion to modernize the Fleet.
- A 200 percent increase in the Special Forces, trained to deal with counterinsurgency threats.

BRL Conducts 5-Inch Gun Probes to 220,000 Feet at Wallops Island Station

A series of 5-inch gun probes that began Sept. 26 by the U.S. Army Ballistics Research Laboratories (BRL) recorded successful launching and tracking operations at altitudes up to 220,000 feet at the National Aeronautics and Space Agency's (NASA) Wallops Island (Va.) site.

Transported to the NASA station last month for a series of tests to determine projectile flight trajectory, the T-123 smooth-bore tank gun (mounted on a 155 mm., M-2 field carriage) is being used in a low-cost, high-altitude research system.

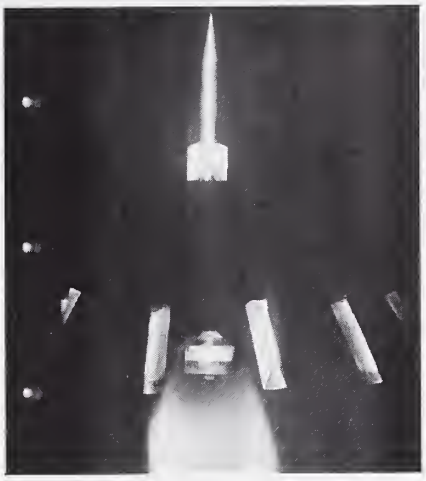
In progress at BRL, Aberdeen Proving Ground, Md., since 1960, the tests are designed to obtain information on high-altitude atmospheric characteristics and their influence on entry and re-entry.

Dr. Hoyt Lemons, chief of the U.S. Army Research Office Geophysical Sciences Branch, Environmental Sciences Division, and Dr. Charles Murphy, chief of the Free-Flight Aerodynamics Branch, BRL, observed the firings Sept. 27.

Single-stage, inert projectiles, 2.5 inches in diameter and 45.5 inches long, were launched to altitudes ranging from 70,000 feet to 220,000 feet, and reached impact ranges from 18 to 35 miles into the Atlantic.

Launch angles varied from 45 to 80 degrees and payload ejection systems were ignited by Naval Ordnance Laboratory or Picatinny Arsenal pyro-delay columns.

Payloads of chaff, a 6-foot square silk metalized parachute with a ballast weight and a flash system for night firings, were tracked by NASA's long-range Spandar and two shorter-range FPS-16 radars.



Taken at 60 feet from gun muzzle, high-speed camera photo of inert projectile used in BRL high altitude tests shows tines and base plate at moment of separation from projectile.

The flights of the fin-stabilized, sabot-controlled (sabot breaks away at discharge) projectiles were plotted and recorded in a cooperative effort of BRL and NASA personnel. A Fastax camera photographed the projectiles at 30 to 50 feet from the muzzle of the gun.

The bench-level engineers working on the firings included Eugene D. Boyer, BRL field test director; Ralph D. Welsh, Wallops Island project engineer and assistant test director; Robert T. Long, and Robert L. Delucia, range safety officer.

As this publication went to press plans were well advanced to transport a 7-inch gun-probe from Aberdeen to Wallops Island Station for firings in November.

Capable of a larger payload, the projectiles to be launched by the 7-inch smooth-bore gun are expected to attain altitudes and send data from 250,000 to 350,000 feet.

BRL engineers load T-123, 128 mm., smooth-bore tank gun for vertical firing of high altitude projectile during atmospheric and tracking tests at Wallops Island Station.

Col Ostrom Relieves Entwhistle as CO of APG Labs

Col Charles D. Y. Ostrom, Jr., relieved Col Richard R. Entwhistle upon his retirement as commanding officer of the U.S. Army Ballistic Research Laboratories, Human Engineering Laboratories, and the Coating and Chemical Lab at Aberdeen Proving Ground, Md.

Col Ostrom was commanding officer of the European Research Office of the U.S. Army Research and Development Group, Frankfurt, Germany, for the past three years.

After receiving a B.S. degree from the University of California, he earned M.S. degrees in engineering from Harvard University and the Massachusetts Institute of Technology. He has also graduated from the Command and General Staff College at Fort Leavenworth (1955) and the Industrial College of the Armed Forces at Fort Lesley J. McNair (1960).

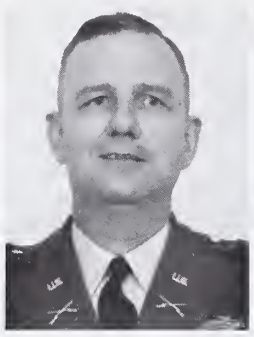
Col Ostrom is the son of Brig Gen Charles D. Y. Ostrom (USA, Ret.). His brother, Lt Col Thomas R. Ostrom, Medical Service, is presently serving with the Seventh U.S. Army, Europe. His father-in-law is Col Milton E. Wilson (USA, Ret.), former commandant of the U.S. Army Ordnance School at the Proving Ground.

Commissioned in 1941 as a second lieutenant in the Ordnance Corps, he was stationed at San Francisco as ammunition officer, Headquarters, Fourth U.S. Army, then with the Ninth U.S. Army, which carried him from the United Kingdom into France, the Netherlands and Germany (July 1944-May 1945).

Col Ostrom served previously as executive officer, Research and Development Division, Samuel Feldman Laboratories at Picatinny Arsenal, Dover, N.J. (June 1952-July 1954), then as chief, Research Division, Office of the Chief of Ordnance.

Col Charles D. Y. Ostrom, Jr.

Col Stewart C. Meyer



Col Wm. G. Sullivan

Col Alvin E. Cowan

Col Jack G. Hines

Col Henry J. Cronin

Five Colonels Top List of New OCRD Key Staff Officer Assignments

Colonels Stewart C. Meyer, William G. Sullivan, Alvin E. Cowan, Jack G. Hines and Henry J. Cronin head the list of recent newcomers to key staff officer assignments in the Office of the Chief of Research and Development.

As the new chief of the Policy Division, Plans and Programs Directorate, Col Meyer has a job that involves numerous high priority projects. One is AUTOPROBE, a far-ranging effort to improve the collection and dissemination of information for top management.

Graduated from the U.S. Military Academy in 1943, Col Meyer earned a master's degree in mechanical engineering from the University of Michigan in 1950. He comes to his new job fresh from completing a 1-year course at the Army War College, Carlisle Barracks, Pa. He is also a graduate of the Command and General Staff College, and the Advanced Officers School.

World War II duty as a battery commander in the European Theater of Operations followed his graduation from the Military Academy. More recent assignments have included service as a staff officer in the Materiel Developments Division, U.S. Continental Army Command (1956-59), battalion commander with the U.S. Army in Germany (1959-60), and commander of the 8th Infantry Division Airborne Brigade in Germany (1960-62).

COL SULLIVAN (William G.), new chief of the U.S. Army Research Office Human Factors and Operations Research Division, succeeds Col Jack M. Duncan. Col Sullivan received his B.S. in biology and chemistry from Western Kentucky State College in 1940, and his M.A. in management from the University of Texas in 1954.

COL COWAN (Alvin E.), chief, Plans Division, is serving his third tour in Washington, D.C., and his second in OCRD.

He received his B.S., M.A. and Ph. D. degrees in physics from the University of Texas.

From 1956-59, Col Cowan was chief, Atomic Division for OCRD, and in 1961, he served as a member of the Joint Chiefs of Staff.

COL HINES (Jack G.) is the new chief of the Communications-Electronics Division.

A graduate of Texas A & M in electrical engineering (1941), he received his master's degree in international relations from George Washington University (1961). He has attended the Advanced Officers Course, Command and General Staff College and the Army War College.

From 1956-60, he served on the Chief of Staff and the Joint Chiefs of Staff in Washington, D.C. In 1962-63 he was in Vietnam for two tours with MAAG, first as chief of the Signal Branch, then as assistant chief of staff, J-6.

COL CRONIN (Henry J.), new chief of the Combat Materiels Division, was reassigned from duty in Korea where he was chief, Operations Division, S-3, 8th U.S. Army.

He graduated in civil engineering from Virginia Military Institute (1939), and has completed the Advanced Artillery Course, Advanced Armored Course, Command and General Staff College, and War College.

Prior to serving in Korea he was a J-5 officer of the Joint Policy Branch Commander-in-Chief of the Pacific.

Transportation Chief Sawyer Gets Maj Gen Rank

Maj Gen Edward W. Sawyer, U.S. Army Chief of Transportation, assumed that rank Sept. 17 following Senate confirmation of his promotion, announced by Secretary of the Army Cyrus R. Vance.

General Sawyer was assistant commandant, U.S. Army Transportation School, Fort Eustis, Va., until June 1963. He served in Washington from 1959 to 1961 as deputy commander of the Defense Traffic Management Service.

Born in Augusta, Maine, in 1913, he attended Colby College and the U.S. Military Academy, where he was commissioned in the Cavalry on graduating in 1935. He holds a master's degree in business administration from Harvard University, and is a National War College graduate.

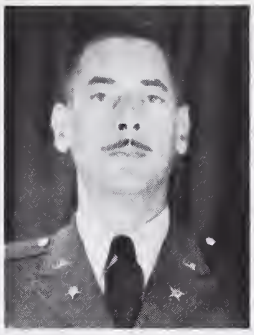
In World War II he participated in landings on Leyte and Luzon. He was assistant chief of staff, G-4, I Corps, during the final phases of the Luzon campaign and the early months of the occupation of Japan. He returned to the Far East in 1952 to command the centralized Japan Procurement Agency.

Subsequently he was chief of staff at Fort Eustis, chief of staff of the Pacific Terminal Command, Fort Mason, Calif., and assistant chief of Transportation for Materiel and Personnel.

His decorations include the Legion of Merit with two Oak Leaf Clusters, the Bronze Star, and the Army Commendation Medal.

Maj Gen Edward W. Sawyer

Lt Col J. S. Sullivan



Lt Col Eugene J. Small

Lt Col R. F. Aquilina

Maj W. J. Cummings

Maj Edwin B. Junge

LT COL SULLIVAN (John S.), staff officer at the Long Range Plans Branch, Plans Division, is a 1944 graduate of the U.S. Military Academy. He joined the Plans Division after completing Army War College.

Assigned to the 273rd Infantry, 69th Division, he served in Europe in 1944-45. He followed this assignment as company commander of the 3rd Infantry Division of the U.S. Constabulary Forces, preceding an Infantry School tour (1947-50).

After completing the course at the Command and General Staff College (1956), he served in Korea, Japan and France. He commanded the 3rd ARB, 50th Infantry in Germany prior to attending the War College.

LT COL SMALL (Eugene J.) has taken over as chief, High Altitude Systems Branch, Air Defense Division after serving as commander of the Nike Hercules Battalion in N.Y.C.

He studied mechanical engineering at New York University for three years and received his B.A. in military science from the University of Maryland in 1955. He did graduate work in education at Northeastern University in Massachusetts.

In Thule, Greenland, he served as Nike Hercules Conversion package commander and group executive officer (1958-59), then was the U.S. Continental Army Command liaison officer at the Raytheon Manufacturing Co. and Lincoln Laboratory at the Massachusetts Institute of Technology.

His military schooling commenced with OCS for artillery in 1942, and culminated with the Command and General Staff College in 1957. In 1947 he attended the Radar Electronics School at Fort Bliss, Tex., and in 1951 completed the Advanced Artillery Course at Fort Sill, Okla., where he later taught for three years.

LT COL AQUILINA (Raymond F.), new staff officer in the Zeus Office, is a 1961 graduate of the University of Maryland with a B.A. degree in military science.

Prior to his present assignment, he was commander of the 3rd Missile Battalion, 5th Artillery at Quincy, Mass., and in 1961-62 served as plans adviser, then branch chief to MAAG, in Vietnam.

Military training includes the Advanced Artillery Course (1951), Command and General Staff College (1955), Nike Universal Officers Qualification Course (1958), and the Nike Hercules Officers Transition Course (1962).

MAJ CUMMINGS (William J.) is a new research coordinator at the U.S. Army Research Office, Operations Research Branch, Human Factors and Operations Research Div.

Fifteen years after receiving a B.S. degree in business law from the University of Tennessee, he earned an M.A. degree in operations research in 1963 from Ohio State U.

He has completed courses at the Command and General Staff College (1960-61), Nuclear Weapons Employment Special Course at the CGSC (1961), and the Advanced Infantry Course (1956).

Recent assignments include instructor at the Infantry School, Fort Benning, Ga., and air reconniassance officer at Hq. 8th Army, Korea.

MAJ JUNGE (Edwin B.) has been assigned to the staff of the Operations Research and Advisory Group, Research Analysis Corp.

Graduated from Texas A & M in 1942 with a degree in accounting and statistics, he has attended the Army Advanced Artillery School, Liaison Pilots Training (U.S. Marine Corps), Advanced Pilots Training, Officer's Survey Course, Primary Helicopter Course, and the Command and General Staff College.

During World War II, he served as a field artillery battery officer and a liaison pilot. In the Korean War he was a battery commander, battalion assistant S-3, aviation company CO.

RAC Work Program Approved After Review by AORSC

Maj Gen George W. Power, deputy chief of Research and Development, has approved the recommendations submitted by the Army Operations Research Steering Committee.

Senior representatives from the Army staff and major commands discussed in detail the proposed work program prepared by the Research Analysis Corp. (RAC) for the 1964 work year which began Sept. 1, 1963.

The meeting of the AORSC formalized the projects which will be undertaken by RAC. Many months of preparation were necessary prior to the meeting to develop and coordinate study proposals received from the Army staff and commands.

The primary mission of the AORSC, which meets semiannually, is to provide guidance to the Army Operation Research Study Program (AORSP) by advising the CRD regarding its direction and by reviewing objectives and their status.

Membership on the AORSC includes: Director of Army Research (Chairman), OCRD, and representatives from the offices of Chief of Staff, Deputy Chiefs of Staff, Chief of Research and Development, Comptroller, Assistant Chief of Staff for Force Development, Assistant Chief of Staff for Intelligence, U.S. Army Materiel Command, U.S. Army Combat Developments Command, U.S. Continental Army Command, and U.S. Army Air Defense Command.

RAC was formed as an outgrowth of the Operations Research Office of the Johns Hopkins University in 1961. Its interest is in the field of advanced scientific thinking concerning Department of Defense problems.

Starting with a roster of 426, RAC now employs 495 and expects an increase to about 1,000 in analyst and support work by 1970.

RAC is organized into three directorates. The combat systems, logistics and management systems, and systems engineering are charged with program technical direction.

Contract Awards Exceed $107 Million

Contracts totaling more than $107 million for development and procurement of military materiel were announced recently by the Department of the Army.

The largest single contract of $30,283,796 originated at Redstone (Ala.) Arsenal, U.S. Army Missile Command. Six firms will work on the Shillelagh, Nike Hercules, Hawk and Sergeant missile systems, and one target missile, namely:

Douglas Aircraft Co., $10,143,000; Sperry Utah Co., $8,588,319; Philco Corp., Aeronutronics Division of Ford Motor Co., $7,000,000; Nortronic Division of Northrop Corp., $2,012,720; Intercontinental Manufacturing Co., $1,097,167; Beech Aircraft Co., $1,442,595.

The Remington Arms Co., Bridgeport, Conn., was awarded a $26,297,414 contract for 7.62 mm. ammunition. For propellants and explosives, the Hercules Powder Co., Wilmington, Del., received a $13,403,064 order.

A $12,400,324 contract for the production of vehicular radio set components was let to the Magnavox Co., Fort Wayne, Ind. The Hercules Engine Division of the Hupp Corp., Canton, Ohio, bid successfully at $11,752,095 for 4,632 multifuel 5-ton truck engines.

Rocket motors for the Nike Hercules, Sergeant and Pershing missiles, will be produced by the Thiokol Chemical Corp., Bristol, Pa., for $4,145,545. Dorsey Trailers, Inc., Elba, Ala., will receive $2,268,739 for 333 semitrailers.

Raytheon Co., Lexington, Mass., was awarded a $2,222,259 contract for Hawk missile system battery sets and the Weatherhead Co. of Cleveland, Ohio, $2,204,208 for work on metal parts for 105 mm. shells.

A bid of $1,566,639 won the Mason and Hanger-Silas Mason Co., Inc., New York, a contract for explosives. The Stewart-Warner Corp., Indianapolis, Ind., will get $1,319,811 for 4,739 heater kits for the M-113 personnel carrier.

Henry Products Co., Brooklyn, N.Y., was awarded a $1,256,058 contract for vehicular radio antennae.

Seven contracts aggregating $491,319 were announced by the Procurement Office at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va. General Electric Co., will receive $223,646 for a product engineering measures study on development of an image intensifier tube. A $92,500 contract to Lawless C. Diesel, City of Industry, Calif., is for a diesel engine driven pump unit for use in 12-inch pipeline systems.

Universal Mine Detector developed by the U.S. Army Engineer Research and Development Laboratories at Fort Belvoir, Va., is capable of locating nonmetallic as well as metallic mines. Undergoing tests at Fort Knox, Ky., and Fort Benning, Ga., the microwave device uses transistors and etched circuitry in place of the conventional tubes and wiring utilized in the detector it will replace.

Dugway Plans Improvements to Cost Army $4 Million

The Army has announced plans to spend nearly $4 million at Dugway Proving Ground, Utah, to improve facilities at the toxic test support area over a 3½-year period.

Army Director of Installations Maj Gen W. R. Schuler said the improvement project would include remote instrumentation of hazardous test operations, a toxic agent transfer building and a metal and woodworking shop.

An Army Test and Evaluation Command installation, Dugway is the center for tests involving equipment and material for use against chemical and biological attack. The installation is located on the fringes of the Great Salt Lake Desert and covers over 1,000,000 acres of Utah's Tooele County.

The Army asked $800,087 for initial phase work, including a toxic agent transfer building the Army hopes to erect this year. Plans call for lining with stainless steel to withstand corrosive action to the materials being handled.

A second phase of the improvements would involve about $1.5 million in construction on the range area. A third phase involves an additional $1.5 in range improvements.

"This program affects all the equipment and buildings and special facilities to match our modernized testing techniques now employed at Dugway," said Col Paul R. Cerar, commanding officer.

The improvements are to be made in a general plan to solidify the permanency of Dugway and make the installation more attractive to technically qualified scientific personnel. Many of the temporary buildings in the technical area are being replaced.

Dugway is preparing for an expanded program in the type of test and evaluation carried on in the desert test laboratory covering over 500,000 acres.

Officials said foundations are also being poured on 66 new housing units costing over $1 million.

Dr. Hass Edits Publication On 'Physics of Thin Films'

Physics of Thin Films, Vol. 1, a recent 350-page publication, was edited by Dr. Georg Hass, chief of the Physics Research Laboratory, U.S. Army Mobility Command, Engineer Research and Development Laboratories, Fort Belvoir, Va.

Spurred by the development of high and ultra-high vacuum systems, thin films have become increasingly important in the fields of optics, solid-state physics, surface chemistry and electronics.

Volume 1 deals with fundamental and applied research on the preparation, properties and applications of thin films and with fields in which research on thin films has led to an understanding of physical and chemical phenomena.

Chapters by three former employees of the Laboratories are included in Volume 1. Peter H. Berning authored "Theory and Calculations of Optical Thin Films." Dr. Robert P. Madden contributed "Preparation and Measurement of Reflecting Coatings for the Vacuum Ultraviolet." Dr. Rudolph E. Thun reported on "Structure of Thin Films."

Internationally known for his work on thin films and optics, Dr. Hass is coediting Volume 2 with Dr. Thun.

Volume 1 may be obtained at a cost of $13 from the Academic Press, 111 Fifth Ave., New York, N.Y., or Berkeley Square House, London, W.1.

Chief of WRGH Surgical Clinic Wins Meritorious Civilian Service Award

Dr. Daniel J. Abramson recently received the Meritorious Civilian Service Award for establishing "standards of immeasurable value to the surgical residents assigned to the Department of Hospital Clinics at Walter Reed General Hospital."

Brig Gen Henry S. Murphy, WRGH commander, presented the award and citation, recognizing Dr. Abramson's service as chief of the Surgical Clinic since 1950. The citation stated:

"His contributions to the development of a modified exteriorization or marsupitalization procedure in the treatment of pilonidal cysts and sinuses and outpatient procedures in breast biopsies are highly significant, successful innovations. . . ."

Dr. Abramson earned his bachelor of science and doctor of medicine degrees from the University of Maryland. After completing his internship at York (Pa.) Hospital, and part of his residency at Washington, D.C. General Hospital, he served at various Federal hospitals and World War II military service prior to joining Walter Reed.

In addition to his civilian assignment at Walter Reed, Dr. Abramson is on the attending staff at Children's Hospital and Washington Center, both in Washington, D.C. He is also an instructor in surgery at Georgetown University Hospital and has a private practice in general surgery.

Dr. Daniel J. Abramson displays Meritorious Civilian Service Citation and medal presented by Brig Gen Henry S. Murphy, WRGH commander. Mrs. Abramson, Bonnie, and Daniel J. Abramson, Jr., are the proud bystanders.

Awarded first prize by the D.C. Medical Society for an exhibit on pilonidal sinuses in 1958, Dr. Abramson received a second award for the exhibit in 1959 by the American Medical Association.

Standards for which he received the Meritorious Civilian Service Award involve treatment of pilonidal cysts and sinuses on an outpatient basis, using local field block anesthesia.

Convalescence time has been considerably reduced. It is reported that the results haved not only manpower time but also bed space in the hospital which, from a monetary standpoint alone, is estimated to have saved nearly half a million dollars.

In addition to developing a bedside micropronthrombin test in common use, Dr. Abramson is the inventor of a diagnostic surgical examining instrument used in protology now being used commercially.

Dr. William McCorkle (right), chief of the Directorate Advanced Systems Laboratory at the Army Missile Command, receives the U.S. Army Research and Development Achievement Award from Col D. F. Shepherd, director of R&D at AMC. Dr. McCorkle was recognized primarily for the development of the Automatic Meteorological Compensation System, which was incorporated into the guidance system of the Lance missile. He has been granted two patents for missile developments and has applications pending for five others. The pictorial embellishment is, as you might surmise, Mrs. McCorkle.

Brig Gen Girard Assigned As Commander of CDEC

Brig Gen Charles J. Girard, backed by a 22-year Army career, is the new commander of the U.S. Army Combat Developments Command Experimentation Center at Ford Ord, Calif.

Formerly he was chief of the Doctrine and Concepts Division for the Director of Combat Developments, Office of the Deputy Chief of Staff for Military Operations, Department of the Army.

General Girard graduated from The Citadel in Charleston, S.C., in 1938 with a B.A. in business administration. Among numerous Army schools he has attended are the Command and General Staff College and the Army War College.

His more recent assignments include: chief, Combat Developments Group, Command and General Staff Department, Armored School at Fort Knox, Ky.; chief, Training Branch, G–3 Division, Hq., U.S. Army, Europe; command assignments with both the 1st and 3rd Armored Divisions and with the Office of the Deputy Chief of Staff for Military Operations in Washington, D.C.

Decorations he is entitled to wear include the Silver Star, Bronze Star and the Army Commendation Medal with one Oak Leaf Cluster.

Combat Control Group Activated at Fort Belvoir

The Combat Control Information System (CCIS) Group, organized to assist in bringing modern computer techniques to the battle zone, has been activated by the U.S. Army Combat Developments Command (USACDC) at Fort Belvoir, Va.

Created as the seventh of the USACDC's major subordinate headquarters, the new activity will provide overall requirements and user coordination on the computerized information program from concept to troop operation.

Army interest in automated data systems goes back to World War I. By the end of World War II, the Army was pioneering in research and development of electronic data processing equipment and systems. However, the early systems were just speedier records-keeping methods or were designed specifically for missiles, air defense and fire control.

As the conduct of modern war became more complex, the computer was eyed as a means of shortening the field army's reaction time, possibly by speeding up the processing of battlefield information required for the command and control of tactical operations.

From the many efforts launched to develop field computers or to "militarize" commercial data processing equipment, a long-range program was undertaken to develop computers as aids to tactical decision-makers.

The CCIS Group, under Col Jack F. Diggs, was activated to perform USACDC's portion of this mission. It will work to insure that hardware is developed to meet the needs of the user. Unit headquarters will be encouraged to improve their operation through the Group's services.

Combat Developments Command and CCIS Group interests are in the overall concept and implementation of the program, beginning with studies to identify the countless types of critical information that may be effectively computerized.

In addition to providing a realistic program for users, the Group will define objectives and requirements to guide the technical developers and other agencies concerned with producing the subsystem equipment.

CDC guidance assures that the CCIS is aligned with currently approved concepts and doctrine. It seeks to smooth the integration of subsystems by establishing priorities, test schedules and advising on special technical training from the user's viewpoint. While the hardware is being developed and tested by AMC, the CCIS Group will coordinate the "software" or computer-use programing.

Lt Col Anderson Q. Smith, AMC's CCIS project manager, will be located with Col Diggs at Fort Belvoir to facilitate staff management and hardware development coordination.

The CCIS Group deputy, Col Roland V. Tiede, and the Group Divisions are located at Fort Huachuca, Ariz., the site of CDC's Communications and Electronics Agency and a major portion of AMC's testing.

$1,988,750 Universal Engineer Tractor Contract Let

Fabrication of six service test Universal Engineer Tractors (UET) is ordered under a $1,988,750 contract granted last month by the U.S. Army Mobility Command's Engineer Research and Development Laboratories.

Following eight months of rugged competition with another model at Fort Belvoir, Va., the International Harvester Co. of Melrose Park, Ill., received the contract.

The 14-ton UET is a highly mobile armored vehicle designed to transport engineer troops and to perform a wide variety of earth-moving and battlefield construction tasks. It will perform the functions of a bulldozer, grader, scraper, dump truck, cargo carrier and prime mover.

The UET features a front-loading ballast bowl which accommodates enough dirt to double its weight and production capacity. A hydraulic apron that lifts enables the operator to eject the load on-the-go, or dump it over an embankment.

The armored earthmover can also carry a squad of combat engineers with their weapons and basic equipment to the scene of battle. A hydropneumatic suspension system, which is rigid for earth-moving operations, is "sprung" or flexible for travel over rough terrain at speeds up to 30 miles per hour.

Expected to be perfected and in the hands of troops in 1966, the versatile machine can also work in water six feet deep, float, or propel itself across rivers and lakes at speeds up to four miles per hour.

Combat construction UET, in production for the Army, performs functions of bulldozer, grader, dumptruck, scraper, prime mover, cargo carrier.

Conference Considers Army Personnel Needs

U.S. Army Combat Developments Command (USACDC) and CONARC officers and civilian experts convened at Aberdeen Proving Ground, Md., Sept. 18-20, to discuss personnel needs of the 1965-70 Army.

The USACDC Ordnance Agency's Organization and Doctrine Division, headed by Col George P. Holm, was host for the 3-day meeting, in which virtually every maintenance, ammunition and guided missile military occupational specialty (MOS) was scrutinized.

The meeting grew out of a USACDC study, "Enlisted Maintenance and Ammunition Service Skill Requirements During 1965-70." Representatives from 10 Army schools, 12 USACDC field agencies, the Defense Atomic Support Agency and the U.S. Army Maintenance Board stated their views of the study.

The Organization and Doctrine Division is expected to revise and recoordinate the study in the light of conference suggestions.

In its final form, the study will be submitted through USACDC channels to the Department of the Army for approval and implementation of recommended MOS structure to support equipment the Army will operate in the field by 1965-70.

Col Ralph M. McMahon, commanding officer, USACDC Ordnance Agency, said, "Conference recommendations are expected to bring about improvements in an individual's responsibilities and duties within a given MOS.

"MOS changes, of course, will require some modification of tables of organization and equipment attendant revisions in supporting service school courses."

Army Natick Labs Honor Danish Physicist for Food Radiation Research

Danish nuclear physicist Dr. Ari Brynjolfsson has received a Certificate of Achievement from the U.S. Army Radiation Laboratory at Natick, Mass., for research in the U.S. national food radiation program.

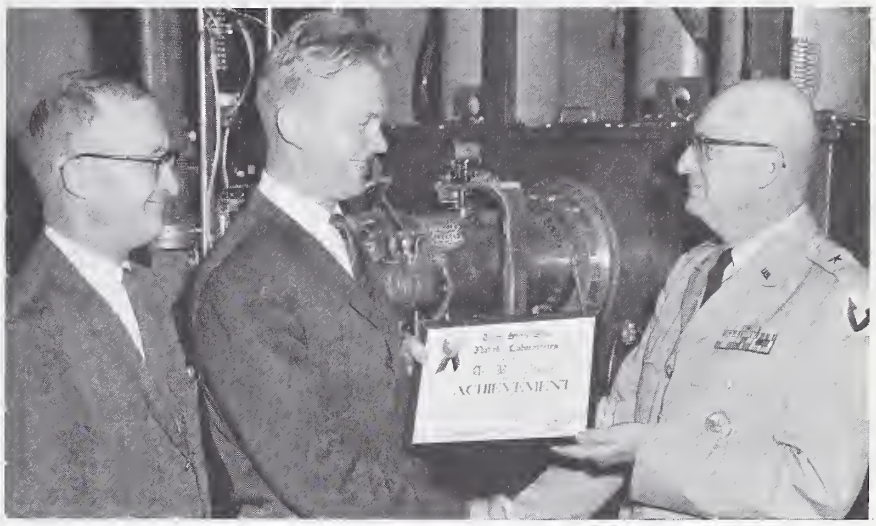
Under sponsorship of the U.S. Army Research Office-Europe, Office of the Chief of Research and Development, the noted scientist was employed at the Radiation Laboratory the past year.

The citation recognized his notable service during the critical period of installation, shakedown and early exploratory use of the world's largest cobalt-60 source (1.3 million curries) and the 24-million-lectron-volt, 18-kilowatt linear accelerator.

In making the presentation prior to Dr. Brynjolfsson's return to Denmark, Brig Gen Merrill L. Tribe, CG of the U.S. Army Natick Laboratories, said: "He helped to make this Laboratory a successful operating facility and contributed substantially in advancing the national food radiation research program. . . . His service stands as a remarkable achievement in international cooperation."

Dr. Dale H. Sieling, scientific director, praised Dr. Brynjolfsson for his "unique scientific proficiency in nuclear physics, particularly in the linear accelerator, radio-nuclids and dosimetry fields." His work was termed an "inspiration" to the radiation laboratory staff.

Dr. Brynjolfsson, by his preparation of supporting scientific data, also played a key role in the Army's latest petition to the Food and Drug Administration (FDA) for the clearance of bacon preserved by 10 MEV electron beams at the Radiation Lab.



Danish physicist, Dr. Ari Brynjolfsson receives congratulations and Certificate of Achievement from Brig Gen Merrill Tribe, CG, U.S. Army Natick Labs. Observer, Dr. Dale Sieling, Natick scientific director, stands near 24 MEV, 18 kw. linear accelerator Dr. Brynjolfsson helped to install and operate.

The FDA in February 1962 approved cobalt-60 preserved bacon for unrestricted human consumption. A petition for approval of wheat and wheat products, including flour, based on Army research data, was approved in August.

International food experts say the approval will save millions of dollars and millions of lives in underdeveloped nations receiving surplus wheat from the United States. FDA is also considering an Army petition for potatoes, irradiated by cobalt-60 to inhibit sprouting.

The 36-year-old Dr. Brynjolfsson, a native of Iceland, has been employed by the Danish Atomic Energy Commission since 1957. He served first as construction chief of Denmark's cobalt-60 irradiation unit, and later erection of a linear accelerator.

Until the U.S. Army Radiation Laboratory dedication last year, the Danish linear accelerator was described as the world's most powerful food research tool. (The Natick accelerator is described in the June 1962 issue of this publication.)

Dr. Brynjolfsson also served as chief of irradiation facilities and dosimetry research at Riso, Denmark. Since 1961 he has been chief of the flux measurements in reactors and radioactive source standardization.

Monmouth Personnel Play Key Role at IEEE Parley

Centered on the theme of National Information and Command Control Systems, the 7th National Military Electronics Conference at Washington, D.C., Sept. 9-11, drew thousands of U.S. and Free World scientists. The sponsor was the Institute of Electrical and Electronic Engineers.

Personnel of the U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J., played a prominent role as chairmen of two of the primary sessions and by presenting eight of the more than 100 technical papers on advances.

Dr. James D. Meindl, chief of the Laboratories' Semiconductor and Microelectronics Branch, and Harry W. Parmer, director of technical plans, presided as chairmen of sessions on military electronics systems.

Dr. James J. Lamb, chief scientist of the U.S. Army Electronics Command (ECOM) Electronics Research and Development Activity at Fort Huachuca, Ariz., chaired a session on the U.S. Army Tactical Automatic Data Processing System.

Presentations by USAELRDL personnel included: Switching Application for the Parametron, George Thomas; Minipac — a Battery-Powered, Low-Cost Field Computer, Edward Lieblein, William Cave, John Cox and Roy Mattson; Engineering Evaluation of Digital Data Transmission Capability of Tactical Army Communication Equipment, John Duffy and James Tucker;

A New Approach to Radio Set Design, Rudolph Riehs, Marvin Curtis and Derek Morris; Real Time Control of Military Communication Switching Centers by Digital Computers, Horst Ulfers; Recent Advances in Microelectronics, Dr. Jere Hohmann; Semiconductor Devices for Microwave Receivers, George Hambleton; Effective Packaging of Microelectronics with Micromodules, Robert Gerhold.

More than 150 exhibits from U.S. Government civilian agencies and military services and from U.S. and Canadian industry were displayed. One of the featured exhibits, developed by the U.S. Army Electronics Command Exhibit Section, depicted tactical field radio communications, combat surveillance and various stages of research and development of electronics systems.

U. S. Army Mobility Command

U. S. ARMY ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES

Military and civilian personnel of the U. S. Army Engineer Research and Development Laboratories are proud to be on the team which is developing the revolutionary tools and techniques that will provide tactical mobility on ANY battlefield.... ANYtime, ANYwhere!

Summary feature articles on facilities and operations of major Army research and development installations were programed in the original plan for establishing the Army Research and Development Newsmagazine. *This article initiates that plan. Similar articles are desired by the editor.*

The U.S. Army Engineer Research and Development Laboratories (USAERDL) at Fort Belvoir, Va., are the principal R&D field agency of the U.S. Army Mobility Command, a major element of the U.S. Army Material Command.

Fort Belvoir, some 15 miles south of Washington, D.C., is situated on the Fairfax estate so closely associated with the early life of George Washington, the country's first commander-in-chief. As a young man, Washington was a frequent visitor to "Belvoir," the spacious manor house of Col William Fairfax. Work on the vast Fairfax holdings embarked him on his surveyor career.

The Corps of Engineers acquired part of the estate and established Camp (later Fort) Humphreys, where 57,000 Engineer troops were trained during World War I, and 147,000 in World War II. In 1935, the name was changed to Fort Belvoir and the reservation was increased from the original purchase of 1,500 acres by the War Department in 1912 to an area of nearly 10,000 acres.

The Laboratories are descended from a series of special boards of officers established by the Corps of Engineers as far back as 1870 for the development or modification of military equipment. The Board on Engineer Equipment moved in 1942 into the present location of the Laboratories. Five years later the Board became the Engineer Research and Development Laboratories.

Col J. H. Kerkering

When the Army was reorganized in 1962, the Laboratories' control changed from the Corps of Engineers to the new Mobility Command at Detroit. MOCOM was established to administer the Department of the Army program for research and development, production and procurement, as well as supply management of all types of mobility equipment.

USAERDL's name and mission, however, remain unchanged. This mission is mobility, the essential ingredient of success on the far flung battlefronts of modern war.

Mobility as it pertains to Engineer equipment is their special province, and to achieve it they employ a 5-pronged approach:

- Research, design, development and test of new Engineer materiel.
- Adaptation or modification of materiel to meet new or more exacting requirements.
- Adaptation of commercial equipment to military use.
- Development of application techniques for utilization of materiel.
- Engineering for procurement of this materiel in quantity.

FACILITIES. The diversity of interests covered in the wide scope of this mission is reflected in the varied and, in many cases, unique facilities for research and development housed at the Laboratories.

A new $1.7 million night-vision laboratory under construction will provide a "dark" tunnel and "superclean rooms" for research on infrared and image intensification devices and battlefield illumination. An automated outdoor searchlight range is also available. Studies of thermal imaging devices are conducted with the aid of the most advanced far infrared optical test equipment.

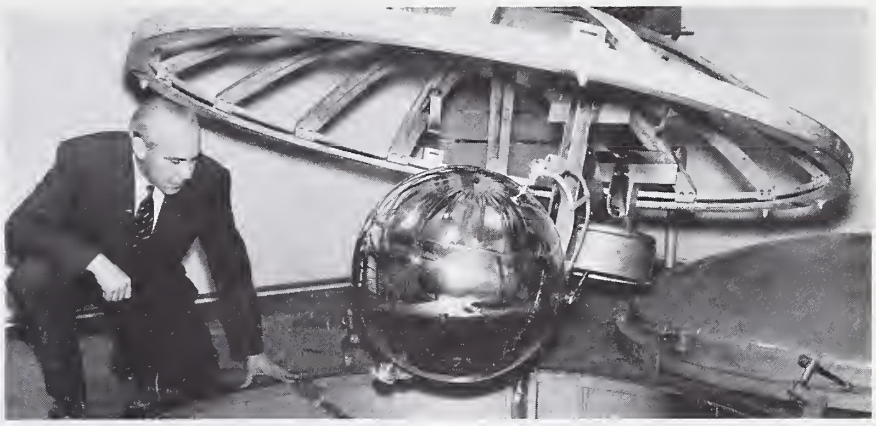
In the Lab's high vacuum chamber for thin film research, many of the satellites now in orbit have been coated with temperature-controlling surface films.

An electric power laboratory affords instrumentation and equipment to test the voltage, power factor and frequency of "precise power" generators for missile systems, under controlled temperature and humidity. Facilities for fuel cell research are also housed in this laboratory.

For development of missile support equipment, USAERDL has recently added an air-conditioning laboratory. Unique in Government installations, it combines in one central location every air conditioner test required from drawing board to production line.

Test facilities are available for the high-pressure air compressors so necessary to the proper functioning of missiles systems.

A power plant laboratory is now being expanded with the additional cells and automatic data acquisition systems for evaluation of power packages, such as reciprocating engines, turbines, special engines and engine accessories.



Many satellites now in orbit have been coated with temperature controlling surface films in the vacuum chamber at the USAERDL, Fort Belvoir, Va.

Hundreds of acres of test courses and miles of instrumentation permit engineer design test of tractors, ditchers, augers and other construction equipment for operational capability, maneuverability and stamina.

Petroleum equipment test facilities include a full-scale model airfield fueling system and other devices to study new fuel decontamination equipment, as well as a military pipeline to test component parts.

A 300-ton hydraulically actuated test frame lets engineers know just how much of a load their new bridges will bear. Gunston Bay on the Potomac River serves to put floating bridge equipment through its paces.

Minefield test lanes with representative soils from every corner of the world give information on electromagnetic soil properties which is recorded for mine detection research.

A shock-test tube stimulates blast effects of high explosives for mine warfare research. In demolitions research, an explosives test sphere contains the effects of actual explosions. Basic research into the very nature of explosives is conducted with the aid of mass spectrometers and highly specialized equipment.

New and improved materials such as alloys, plastics, rubbers, paints and fungicides run the gamut in the Materials Lab test tubes and machines. A climatic test chamber simulates altitude up to 35,000 feet, temperatures from minus 85 to 165° F. and dew, fog, frost and wind.

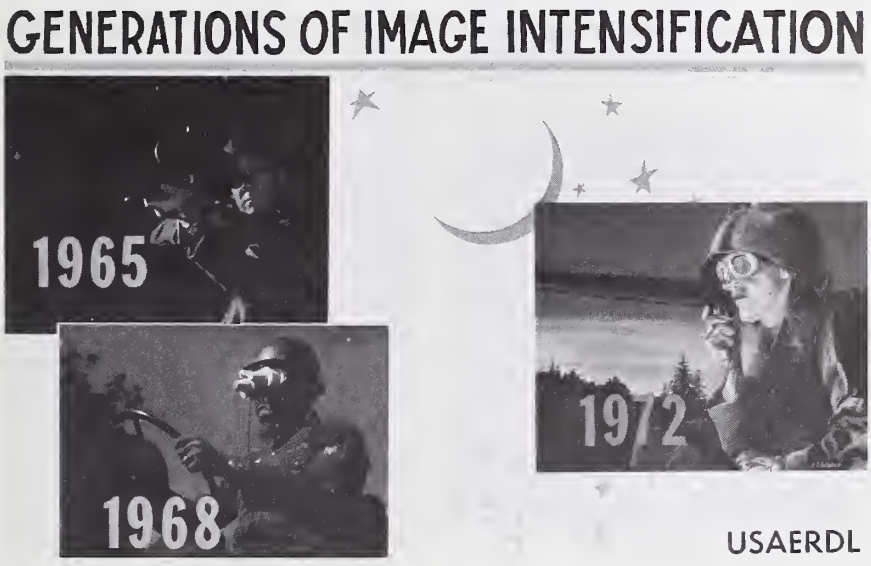
Support services include data processing, instrumentation and engineering services and pictorial science. Machine, woodworking, model and paint shops provide the ultimate in developmental fabrication.

DEVELOPMENTS. The object of these facilities and the aim of the 1,200-plus who use them is to equip the soldier—equip him so that on any battlefield of the future he would be second to none. Mobility, in modern warfare, is his first requirement, and to meet it the Laboratories extend every effort of man and machine.

The need for mobility, dispersion and speed is greatest, perhaps, in the area of construction equipment. Equipment, methods and techniques must be developed to provide rapid construction capabilities to support the mobile fighting forces.

In line with this, the Laboratories have developed lightweight airborne construction items with production rates approaching those of heavy workhorses. Included are air-droppable bulldozers, bucket loaders, motor graders, air compressors, tractor saws and compaction gear.

Airborne wheeled and tracked Universal Engineer Tractors designed to meet a variety of needs are being



tested. Weighing but 13 tons, they are ballastable with dirt or other material to give them scraping and dozing capabilities of heavy movers.

In addition to performing all earth-moving functions as fast as conventional units weighing twice as much, they can be used as personnel or cargo carriers, and are mobile across country or on water.

The Mobile Floating Assault Bridge-Ferry has been designed by the Laboratories to eliminate delays now encountered in getting tanks, weapons, support equipment and men across water barriers.

Now under test, it is designed to meet Army requirements for erection of a 55-ton capacity ferry in 15 minutes by crews of four units, and 400 feet of bridge in one hour by crews of 16 vehicles.

Constructed principally of aluminum, it consists of two amphibious units, and end bay and an interior bay, each carried by the same type transporter vehicle. The basic unit may be assembled into ferries of two or more units or may be connected into a bridge of any length desired.

The transporter vehicle, which becomes a boat in the water, is powered by a 335-h.p. diesel engine to provide road speeds of 35 m.p.h. and water speeds of 7 m.p.h. in ferry operations.

A USAERDL contribution to the mobility of the armored column is the Armored Vehicle Launched Bridge, popularly known as the "scissors" bridge. Now in production, the bridge is carried by a modified tank, and is hydraulically launched from the tank in two minutes without exposing personnel.

Mobility at night is a must for the modern army, because the cover of darkness affords an ideal opportunity to disperse. USAERDL-developed infrared devices give the soldier invisible "light" to make night operations feasible and effective.

Sixty-foot assault bridge can be hydraulically launched in less than two minutes by modified tank carrier. Efforts are now being made to increase bridge length to 100 feet.

To meet modern Army needs for MOBILITY, "We must exploit with all the vigor and imagination at our command every significant scientific and technological breakthrough." *Maj Gen Alden K. Sibley, CG, Army Mobility Command.*

DEVELOP ENGINEER EQUIPMENT FOR THE ARMED FORCES.....

RESEARCH FOR THE FUTURE.....

ADAPT COMMERCIAL EQUIPMENT TO MILITARY REQUIREMENTS.....

DEVELOP TECHNIQUES AND APPLICATIONS.....

ENGINEER FOR QUANTITY PROCUREMENT.....

With items like the weapon sight, metascope and infrared searchlight and binoculars, Infantry and Armor can move and fight in hours of darkness, without disclosing positions.

Image intensification, another means of night vision under development by the Labs, has an advantage over the infrared systems in that it requires no light source. It simply intensifies starlight, moonlight or skyglow to give the soldier "night sight."

Enemy minefields are major obstacles to mobility and as such must be cleared. On the other hand, creation of minefields impedes the mobility of opposing forces. To render the former ineffective, effort and money are being directed toward improvement of detecting and detonating equipment. To accomplish the latter, mechanical and other means of planting minefields are under development and test.

A transistorized mine detector, now in the hands of troops, represents a reduction in weight and maintenance, along with an increase in efficiency. A microwave detector is under test.

A mobile army can't move long without water, so work continues on development of material, methods and techniques for water supply and purification. Mobile water purification units, featuring the ERDLator, have already proved their worth in many areas. A trailer-mounted sea water distillation unit has been successfully tested, and its application to CBR contaminants is under study.

The Laboratories have developed precise power generators for use in ground support of missiles, checkout shelters and special heaters, air conditioners and air compressors so necessary for the missile systems.

The use of plastic foam for the building construction is being tested by the Laboratories.

STAFF. Col J. H. Kerkering, CE, as commanding officer guides the Laboratories in their many fields of endeavor. He is assisted by Col Philip G. Krueger, CE, deputy commanding officer, and a direcorate including Dr. George W. Howard, technical director; Robert W. Beal, director of engineering; and Walter H. Spinks, acting comptroller and director of programs.

Organizationally, the Labs are divided into five technical departments: Electrical, Mechanical, Military, Technical Services, and Engineering. Support departments are Logistic Services and Administrative.

The Laboratories are proud of past accomplishments and confident that, under the Mobility Command, their activities will continue to perform a major role in national defense.

Combat intrenching machine can dig a trench 2-feet wide by 4-feet deep at 20-feet per minute. It can also excavate a foxhole in 1 minute or a machine gun location in 5 minutes.

ECOM Installs Dr. Ziegler as Chief Scientist

Dr. Hans K. Ziegler is installed as the new chief scientist of the U.S. Army Electronics Command (ECOM) at Fort Monmouth, N.J.

Until his assignment to the top civilian position at ECOM, Dr. Ziegler was the chief scientist for the U.S. Army Electronics Research and Development Agency at Fort Monmouth, a major subordinate agency.

A native of Munich, Germany, the 52-year-old scientist holds B.S., M.S., and Ph. D. degrees in electrical engineering from the Technical University of Munich.

Invited to come to this country in 1947 under the auspices of Operation Paperclip, as one of the outstanding German scientists, he accepted a position with what was then the U.S. Army's Signal Corps Engineering Laboratories at Fort Monmouth.

Dr. Ziegler has almost 30 years of broad professional experience in electronics research and development work, particularly in the area of military electronics, obtained in university, private industry and Government assignments.

Awarded a number of patents, he is a productive writer on scientific subjects and has made presentations before many professional and civic groups. His professional competence has been utilized in numerous Government and civilian scientific and technical committees here and abroad.

Dr. Hans K. Ziegler

The job of chief scientist carries with it prime responsibility for extensive research and development programs for the Electronics Command, which is one of five recently created commodity commands of the U.S. Army Materiel Command.

As an important part of his duties, Dr. Ziegler will serve as principal consultant to ECOM commander Maj Gen Stuart Hoff on scientific matters.

Associates credit him with a major role in many Army Signal Corps achievements for military electronics and for the Nation's space effort. Among the latter are the first solar powered satellite, the first communications satellites, and the first weather observation satellites.

He is a Fellow in the Institute of Radio Engineers (IRE) and the American Astronautical Society, a member of the Administrative Committee of the Professional Group on Military Electronics, and a past president of the Fort Monmouth Chapter of the Armed Forces Communications and Electronics Association.

Pershing Missile Ends Environmental Testing

Completion of extensive environmental testing of the Army's highly mobile Pershing ballistic missile system in the tropics, using non-firing equipment, was announced Sept. 17.

The tropical environment tests followed an earlier series of maneuvers conducted in the Arctic extremes of Alaska, and were designed to prove capability to operate in virtually any type terrain or weather condition.

The tests have been under the technical direction of the Army Missile Command's Pershing Project Office under Col O. M. Hirsch as manager.

The missile used by the Army in the environmental tests in both the Arctic and the Canal Zone utilized inert motors which could not be fired. The rest of the missile system and all its ground support equipment were fully operational.

The tests at Fort Sherman, Canal Zone, included road marches, countdowns and a score of other tactical operations designed to further prove out the missile system's reliability for operation in the tropics.

The Pershing is a highly mobile, quick reacting missile system designed as a field Army support weapon. It is a solid-propellant, 2-stage, inertially guided ballistic missile of selective range.

The missile system has undergone the most extensive program of testing ever conducted on an Army missile to prove out its reliability during research and development.

Army Biologist Attends Paris Parley as Consultant

Invited to serve as a consultant, Dr. Warren P. Iverson of the U.S. Army Biological Laboratories, recently attended the International Organization for Economic Cooperation and Development (OECD) conference on biogenic corrosion in France.

Dedicated to economic growth and oriented toward a global 50 percent increase in gross national product in the next decade, the OECD is an organization of 20 countries. It consists of Western Europe, Turkey, Greece, Ireland, the United States and Canada.

Dr. Warren P. Iverson

Areas of interest related to the economy of a country include scientific assistance in improving the quality of water supply, control of air pollution, and prevention of deterioration. OECD's biodeterioration project recently began in the specific area of biological fouling and corrosion of ships' hulls.

Dr. Iverson received a B.A. degree in bacteriology from the University of Wisconsin in 1944 and a Ph. D. in microbiology from Rutgers University in 1949. Upon graduation from Rutgers, he was employed by Parke-Davis Co. in Detroit in antibiotic research until he joined Biological Laboratories at Fort Detrick in 1952. He served with the U.S. Army Medical Corps in WW II.

Author of numerous papers on antibiotics, he has compiled six laboratory manuals for various courses in microbiology, immunity and biochemistry for use in the in-service training program. His current interests are in the fields of microbiological corrosion and bacterial taxonomy.

Dr. Iverson is a member of the American Society of Microbiology, Research Society of America, and the United States National Coordinating Committee on Textiles and Plastics.

USACCL Research Serves Army Materiel Preservation Needs

Research at the U.S. Army Coating and Chemical Laboratory at Aberdeen Proving Ground, Md., serves many priority military requirements for preservation of materiel and aids numerous other governmental agencies.

The Laboratory participates in the industrial preparedness program by establishing and maintaining qualified products lists on items within its assigned fields. It takes part in the standardization program by preparing and reviewing specifications and standards, and provides chemical and consultant services.

Some of the materials developed by the Laboratory include high quality fast-drying primers and lusterless and semigloss enamels and lacquers to meet special requirements of modern production techniques.

Possessing qualities previously unattainable, many of these coatings are being used with great success on munitions, tanks, trucks and other military equipment, and for civilian requirements.

Studies and development work have been done for the Navy as well as for the Army on electrical conductive coatings, ammunition can coatings, hydraulic fluid resistant coatings, and a corrosion resistant coating suitable for use on the interior of missiles, shells, and bombs.

Other special coatings have included a lacquer for fire control instruments, a chemical resistant epoxy coating for rocket motor cases, and an aluminum heat resistant coating to withstand 1200° F.

In the field of metal pretreatment prior to painting, investigations have produced methods for ferrous and nonferrous metals to provide added protection against deterioration.

In the area of packaging materials, work resulted in new transparent hot melt strippable films, providng preservation and packaging in a single operation. Used for packaging small components and spare parts, they permit identification of an item without destroying the protective wrapper, and withstand temperatures ranging from minus 65° F. to plus 165° F. without loss of protection.

For heat sensitive items such as lenses and instruments, a fungus-resistant, low-temperature gel lacquer removable film compound was made.

To facilitate removal of old paint during rebuild operations, a heavy-duty alkaline stripper for ferrous metal and magnesium and a buffered type, that would not attack aluminum or galvanically coupled magnesium and aluminum, were developed.

To remove dirt and soils from normal operation, a steam cleaning compound was formulated that would not clog the tubes of high pressure steam cleaning machines, yet was safe on both ferrous and nonferrous metals.

Similarly, a heavy-duty alkaline compound for ferrous and nonferrous metals was prepared that could also be adopted for hydrosteam cleaning, eliminating the need for an extra compound in the supply system.

To meet the need for a cleaner to remove preservative materials which become relatively insoluble on aging, a self-emulsifiable cleaner was developed that also removed grease, tar and asphalt.

For cleaning pistons in rebuild operations, the Laboratory developed effective carbon loosener compounds that would not present health and waste disposal problems. A process was developed to remove hard-water scale, iron rust and other contaminants from cooling systems.

To facilitate development of new cleaning compounds, basic studies in detergency have been conducted. These made possible the determination of the least number of variables which can be used to describe the efficiency of detergents.

In the field of automotive chemicals, the laboratory has established a single-phase ethylene glycol type compound as the most suitable heavy duty antifreeze for military equipment. To insure operation of military vehicles in arctic regions, an antifreeze was developed to provide protection to minus 90° F.

In the area of hydraulic brake fluids, an all-weather fluid was developed which embodies all the properties of the heavy-duty and Arctic fluids previously developed by the laboratory. This will result in improved efficiency and economy.

A combination preservative operational fluid was formulated to provide preservation for master and wheel cylinders in storage for extended periods, and also permit limited operation without changing to operational brake fluid.

One of the most difficult problems in the materials field is the development of procedures for chemical testing analysis. The Laboratory maintains an Analytical Section that has supplied numerous new and original analytical techniques for Government specifications to assure procurement of suitable products.

The work conducted by the Laboratory has resulted in the preparation or revision of 28 Federal and 55 military specifications to reflect latest technical developments. It has also resulted in 29 patent disclosures, about half of which have been granted. The Laboratory has had more than 60 publications in technical journals and averages 21 technical reports per year.

Investigations are being conducted to develop improved chemical and corrosion resistant primers, particularly for magnesium and mixed metal assemblies.

Other areas include resistant coating for fuel tank interiors, coatings resistant to heat-blast effect of missiles, nontoxic paint strippers to remove chemically resistant finishes, self-emulsifiable cleaners to permit soil removal by water rinse rather than steam cleaning, and metal pretreatments for the prevention of galvanic corrosion.

Exposure Test Farm, U.S. Army Coating and Chemical Lab, APG, Md.

Col Jordahn Takes Command at Watertown Arsenal

New commanding officer of Watertown Arsenal, Col Erik W. Jordahn (right) and former commander Col Robert B. Braid discuss their new jobs during a recent visit to the U.S. Army Missile Command at Redstone Arsenal, Ala.

Col Erik W. Jordahn has succeeded Col Robert B. Braid as commander of the U.S. Army Missile Command element at Watertown (Mass.) Arsenal.

Until reassigned as Nike Zeus deputy project manager at the Missile Command's Redstone (Ala.) Arsenal, Col Braid also commanded the U.S. Army Materials Research Agency at Watertown. Lt Col Joseph E. Black has succeeded him in that capacity, as reported in the September issue of this publication.

A chemical engineering graduate of Georgia Institute of Technology, Col Jordahn also attended the Massachusetts Institute of Technology (1949-50). He assumed his new duties following graduation from the Army War College at Carlisle Barracks, Pa.

With a background in aviation ordnance and ammunition production, he has served as an ordnance and armament officer in Florida, California and Texas, and was munitions production officer at Indiana Arsenal, Charlestown, Ind.

Following an ordnance officer assignment in Korea, he was appointed assistant for Industrial Operation, Command Headquarters, Japan. Upon return to the United States, he worked as procurement officer, Deputy Chief of Staff for Logistics, in Washington, D.C. (1955-58).

From 1959-62, Col Jordahn was assigned as logistics and procurement officer in Germany. His military awards include a citation by the Republic of Korea, the Bronze Service Medal, Army Commendation Medal.

USAERDL Expands Power Plant Lab Facilities

New construction and modernization of existing facilities began last month on the Power Plant Laboratory at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Virginia.

A new brick addition, 60 by 107 feet, will house two turbine test cells. Improvements to the present 80 by 140-foot building will include construction of two new test cells, modernization of existing test cells, better lighting and ventilation, reduction in noise and added safety.

Automatic data acquisition systems will be provided for the eight existing and four new test cells. Work is to be completed by May 1964.

A facility of the Engine Branch of the Mechanical Department, the Power Plant Lab performs research and test evaluations on reciprocating engines to 1,000 brake horsepower, gas turbines to 2,000 brake horsepower, special engines, and engine accessories and components. Facilities are available for conducting these evaluations under normal and extreme climatic conditions.

The Thomas W. Yoder Co., Inc., Rockville, Md., was awarded a $644,550 contract for construction of the new building, and the Roback Corp., Ambler, Pa., was awarded a $224,479 contract for instrumentation and its installation. Both contracts were awarded and will be supervised by the U.S. Army Corps of Engineers, Norfolk District Office, Norfolk, Va.

By Ralph G. H. Siu

THE OSTRICH EGG. Exhortation and pep talks about out-doing the other fellow are sometimes based on the assumption that "anything they can do, we can do better." This may not be necessarily true, as illustrated by the legend of the Ostrich Egg:

It seems that an ostrich egg rolled through the fence into a chicken farm. The rooster saw the large object coming down the slope and ran up to the egg as it came to a halt. He cackled his hens together and crowed a shrill exhortation, "I don't want to complain about the quality of *our* production here. But I'd just like to point out what's going on *elsewhere!*"

THE THRASHER. Many an R&D executive, at one time or another, suffers a frustrating and exhausting experience engendered by meddlesome and powerful individuals in higher and coordinate echelons who keep thrashing about within his operations. The usual defense involves the long-drawn out battle against "higher echelons dabbling in operations." Jonathan Swift alluded to another possible tactic:

Seamen have a custom, when they meet a whale, to fling him an empty tub by way of amusement to divert him from laying violent hands upon the ship.

CRITICS. There are critics and critics, as we all know. Of some, and there are lots of these creeping around, D. H. Lawrence had the following to say.

"To hear these people talk really fills me with black fury: they talk endlessly, but endlessly—and never, never a good thing is said. They are cased each in a hard little shell of his own and out of this they talk words. There is never for one second an outgoing feeling of reverence. I cannot stand it. I will not have people like this—I had rather be alone. They make me dream of a beetle that bites like a scorpion. But I killed it—a very large beetle. It is this horror of little swarming selves I can't stand."

MOUNTED BEGGARS. One must be certain that small minds are not given big responsibilities. As Shakespeare has said: Beggars mounted run their horses to death.

Picatinny Arsenal Obtains FCC Approval for R-F Research Radio Station

Picatinny Arsenal at Dover, N.J., has received Federal Communications Commission approval for a research radio station that will operate on a broad range of frequencies.

The singular task of the station is to acquire knowledge that will help to protect U.S. missiles and Ordnance materiel from being blown up accidentally by a burst of radiated r-f energy from a radar, communication or command transmitter.

Christened AA2xV by the FCC, the station is a part of a new installation constructed by Picatinny's Ammunition Engineering Directorate. Its mission is to study the effects of radiated r-f energy on nuclear and conventional warheads, projectiles and other electrically triggered items.

Conceivably, just the right frequency and field strength might actuate the warhead charges, known as squibs. A continuing program will test all ammunition items as they are developed for susceptibility to r-f heating. Testing has started on warheads to develop standards for r-f environment tolerances for weapons.

Picatinny has also developed protective filters to keep harmful r-f radiation out of explosive squibs in ordnance items, and is studying skin shielding techniques. Other protective measures may include coded actuating devices immune to ordinary r-f.

The Army facility has a large r-f anechoic chamber where smaller items can be tested without outside radiation. Techniques have been developed in which low-frequency radiation will be simulated to avoid the near field problem at relatively close distances to the antenna, and the power dispersion at distant fields.

Although the other two services, as well as the AEC, are doing work in this area, Army spokesmen indicated the Picatinny installation will be the most complete of its kind.

Col Kaiser Assumes Duty As WSMR Chief of Staff

Col William F. Kaiser, the new chief of staff at White Sands (N. Mex.) Missile Range, is a seasoned veteran of Ordnance command assignments, and served previously as commander of the Army Ordnance Depot in Korea.

After receiving his B.A. degree in electrical engineering at Purdue University, where he was commissioned as an ROTC student, he entered the Army and served in the Southwest Pacific Theater. In 1948 he earned a master's degree in business administration from Chicago University.

Prior to assignment to Korea he was assigned to the Army Ballistic Missile Agency at Redstone Arsenal, Ala. He served as deputy and later chief of the Control Office before he became a deputy to the deputy CG for Ballistic Missiles.

In 1952 he was assigned to France to command Captieux Ordnance Depot, following a tour as chief of the Antiaircraft Weapons Department at Frankford (Pa.) Arsenal.

Col William F. Kaiser

Friend Returns to Old Job As Contracts Branch Chief

Hilbert E. Friend is back at the same job he vacated 17 months ago, doing business again as chief of the Research Contracts and Grants Branch, U.S. Army Research Office.

"Hib" was lured to the National Science Foundation by a promotion good for a very substantial increase in pay, but after fighting the traffic jam across the 14th Street Bridge decided he preferred the "other side of the river" and a short drive.

When Guy E. Mastin, who succeeded him after serving as his deputy at USARO, accepted a much higher salaried job with Lockheed-Georgia Co., Marietta, Ga., "Hib" welcomed the opportunity to return to USARO. He qualifies as "almost a charter member" of the staff, having served since March 1958.

Prior to joining USARO in 1958, Friend studied contractual law at George Washington University after receiving a B.S. degree from West Virginia University in 1950.

An attorney by profession, Mastin completed his pre-law studies at Concord College, Athens, W. Va. (1951) and received his LL.B., magna cum laude, from the Walter F. George School of Law, Mercer University, Macon, Ga., in 1954. He joined USARO as a research contract specialist in April 1961.

RAC Selects Dr. Grosse As Economics Unit Chief

Dr. Robert N. Grosse has been appointed chief of the Economics and Costing Division of the Research Analysis Corp. (RAC), Bethesda, Md.

A graduate of Columbia University in 1944, he received his M.A. and Ph. D. degrees in economics from Harvard in 1946 and 1948. He taught at Bates College and Rutgers while gaining his advanced degrees. In recent years he has been acclaimed among eminent defense economists.

Prior to joining RAC he was the director of RAND Corp's Bethesda office where his prime responsibility was to implement RAND studies for the Assistant Secretary of Defense (Comptroller). He also assisted in setting up the new program-budgeting system for the Defense Dept.

Dr. Grosse served on the Harvard University Economics Research Project, which developed basic techniques and data for what eventually became the Inter-Industry Research Program of the Federal Government. He also was a member of the Budget Bureau's Office of Statistical Standards and head of the Factors and Estimates Branch of the Cost Analysis Department at RAND's Santa Monica, Calif., headquarters.

Dr. Robert N. Grosse

Walter Reed Army Medical Center, 6 Officers Cited With Brazilian Government Order of Military Merit

Walter Reed Army Medical Center received the Brazilian Army's highest award and six U.S. Army officers were honored for service which "has strengthened foundations of the confidence between us."

Brig Gen Armando de Noronha, Brazilian Military Attache, presented the Colors of the Order of the Military Merit to Maj Gen A. L. Tynes, MC, commander of Walter Reed Army Medical Center, in the latter's office. The award consisted of a rosette and streamers affixed to the WRMC flag.

". . . This is an act very rarely done, the decorating of the flag of a unit of a friendly country with the Order of Military Merit," General Noronah said. "I emphasize this fact only to make clear our esteem and gratitude for Walter Reed, for its corps of doctors, dentists, pharmacists, nurses, religious personnel.

"It is with equal pleasure and professional pride that I come to deliver to our American companions in arms the decorations which have been awarded them by my government or by the Minister of War as tangible recognition of the services they have given our army."

Admiring the Order of Military Merit attached to the WRAMC Flag, presented on behalf of Brazil by the First Secretary of the Brazilian Embassy, Manual Maria Fernandez Alcazar, are Brig Gen Armando de Noronha, Brazilian Military Attache and Maj Gen A. L. Tynes, WRAMC CO.

U.S. Army officers honored with the Order of Military Merit are Maj Gen Harvey H. Fischer, Col Stanley N. Lonning, Col Birdsey L. Learman and Maj Thomas H. Jones, Jr. The Medal of the Pacificador (Peacemaker) was presented to Col Joseph D. Iseman and Lt Col Chelmer L. Flynn, who accepted all of the honors because others could not attend.

Brazilian government officials included Lt Gen Armando De Souza E. Mello Ararigboia, Air Attache; Manuel M. F. Alcazar, first secretary of the Embassy attending on behalf of the ambassador; and numerous other Military Commission officials.

U.S. Army officials present for the ceremony were headed by Brig Gen Henry S. Murphey, CG, Walter Reed General Hospital, and Brig Gen Robert E. Blount, representing Surgeon General (Lt Gen) Leonard D. Heaton.

Others attending included Brig Gen Oscar J. Ogren, director of dental activities at Walter Reed Medical Center; Brig Gen J. M. Blumberg, director of the Armed Forces Institute of Pathology; Col William D. Tigertt, director and commandant, WRAIR; and Lt Col R. C. Grady, U.S. Army liaison officer to the Brazilian Military Commission.

ECOM Briefs 100 Leaders On Advanced Drone System

The MQM-58A Multipurpose Drone System was viewed by about 100 military, civilian and industrial representatives of the Artillery and Missile fields in a recent orientation session at the U.S. Army Electronics Command, Fort Monmouth, N.J.

One of the six project-managed programs directed by ECOM under the U.S. Army Materiel Command, MQM-58A is a redesignation of the former AN/USD-2. It is designed to provide the Army with electronic systems and equipment for modern warfare.

MQM-58A project manager, Col Daniel P. Gallagher, greeted the visitors in behalf of Maj Gen Frank W. Moorman who recently became the new commanding general of ECOM.

A motion picture presenting a simulated tactical situation, in which the drone surveillance system was used successfully in support of an artillery fire mission, was shown at the orientation.

The remainder of the program was conducted by members of Col Gallagher's staff, representatives of industries that developed the system's components, and a spokesman from the Test and Evaluation Command.

SCIENTIFIC CALENDAR

International Symposium on Plasma Phenomena and Measurements, sponsored by IRE, NASA, AEC and AFOSR, San Diego, Calif., Oct. 28-Nov. 1.

World Meteorological Organization, Geneva, Switzerland, Oct. 28-Nov. 4.

1963 Conference on Electrical Insulation, sponsored by USARO-D and NAS-NRC, White Sulphur Springs, W. Va., Nov. 4-6.

Regional Seminar on Geomagnetic and Ionospheric Observations, Lwiro, Leopoldville, The Congo, Nov. 4-23.

Symposium on Tropical Meterology, Rotorua, New Zealand, Nov. 5-13.

World Meteoroiogical Organization Panel on Tropical Meteorology, Wellington, New Zealand, Nov. 6-13.

1st International Conference on Permafrost, sponsored by AF Cambridge Research Laboratory, Army, Navy, U.S. Geological Survey, NAC, NSF and NRC of Canada, Lafayette, Ind., Nov. 11-15.

Conference on Galvanic Problems, Budapest, Hungary, Nov. 11-12.

5th Liquid Propulsion Symposium, Tampa, Fla., Nov. 12-14.

Laser Tecinology, sponsored by ONR and Advanced Research Proects Agency, San Diego, Calif., Nov. 12-14.

Conference on Magnetism and Magnetic Materials, Atlantic Clty, N.J., Nov. 12-15.

Seminar on Automatic Checkout Equipment and Techniques, sponsored by NASA and Battelle Memorial Institute, Columbus, Ohio, Nov. 13-14.

1963 Symposium on Unconventional Inertial Sensors, Farmingdale, Long Island, N.Y., Nov. 18-19.

Pan Indian Ocean Science Congress, New Delhi, India, Nov. 18-24.

World Health Organization Expert Committee on Prevention of Cancer, Geneva, Switzerland, Nov. 19-25.

Symposium on the Corrosion of Zirconium Alioys, N.Y.C., Nov. 21.

Army Conference on Systemic Insect Repellants, sponsored by the U.S. Army Medicai Research and Development Command, Washington, D.C., Nov. 22-23.

International Symposium on Nuclear Electronics, Paris, France, Nov. 25-27.

Technical Symposium on Technical Progress in Communication Wires and Cables, Asbury Park, N.J., Nov. 27-29.

2nd International Biomagnetic Symposium, Chicago, Ill., Nov. 29-30.

International Symposium on the Thermal Stability of Polymers, Columbus, Ohio, Dec. 5-6.

Symposium on Isotope Mass Effects In Chemistry and Biology, Vienna, Austria, Dec. 9-13.

NPFO Man Gets Year of Study At Oak Ridge National Labs

An employee of the Nuclear Power Field Office (NPFO) at Fort Belvoir, Va., has been selected to attend a special 1-year course at the Oak Ridge (Tenn.) National Laboratories.

Homer D. Musselman, chief of the Electrical Engineering Branch, is among a group of international students enrolled for a nuclear reactor hazardous evaluation program. It is conducted by Union Carbide Nuclear Co. for the U.S. Atomic Energy Commission.

The course began September 16 and is one of two international programs at ORNL in reactor technology. The other program deals with nuclear plant supervision.

Defense Documentation Center Displays Resources in Cameron Station Site

Resources of the Defense Documentation Center to perform its mission, as displayed in the dedication of its new building at Cameron Station, Va., Sept. 18, impressed nearly 100 top-ranking Department of Defense and using-agency leaders.

A reconverted warehouse does not sound particularly attractive, but $1.5 million of ultramodern rehabilitation of a massive brick structure covering the better part of a square block has "worked wonders."

Still known as Warehouse No. 5 in property accounting records, the DDC establishment is windowless but completely air-conditioned and daylighted with fluorescent lights.

The structure provides 130,000 square feet of floor space, all on one floor for efficiency in chain processing of information. DDC's former home at Arlington Hall, Va., provided only 85,000 square feet of scattered space.

The pay-off of any new office building, outside of the work that must be accomplished there, is the pleasure of employees in their accommodations. From that viewpoint, the DDC planners seem to have fared rather well. Even less loss of personnel than normal was reported as a result of the move to a site about six miles farther from Washington.

Consequently, personnel-wise (to coin a term) and with respect to convenient working arrangement of facilities, as well as in consideration of ultramodern new equipment, the DDC is in position to push ahead full speed on a program that is under the supervision of Defense Director of Technical Information Walter M. Carlson.

The anticipated increase in workload is somewhat staggering. Whereas ASTIA, the forerunner of the DDC, processed 25,000 titles annually only two years ago, the present rate is at 68,000—expected to reach 80,000 by the close of FY 1964.

Automation rather than a proportionate increase in staffing is the answer adopted by DDC to the mounting workload problem. During FY 1963 more than a million requests for documents were received. In 1961 the work staff consisted of 360 employees. Now it is 450, a figure expected to reach 500 by June 1964.

New heart of the equipment complex will be a UNIVAC 1107 computer which has an initial increment capacity of 500 million alpha numerical characters of random access storage on drums. Expected to be installed by the end of the year, it has a processing speed of 330 manoseconds (330 billionths of a second).

Even during the dedication orientation tour, a Bell Telephone Data Phone system was clicking away to demonstrate (on a regular work schedule) how modern communication with the Sperry Rand UNIVAC Research and Manufacturing Center in St. Paul, Minn., is "debugging" DDC programing to be compatible with the 1107 computer.

As a result, when the 1107 is installed it will be ready to go to work immediately for the most efficient service possible on any portion of the overall DDC program. The debugging operation on UNIVAC 1004 data and programing cards now in use will thus save a lot of time.

Pride in their new facilities was obvious on the part of Col James O. Vann, who has served as ASTIA and DDC commander for the past two years, and Dr. Charles L. Bernier, technical director, who presided as hosts at the dedication. The new "plant" is the result of many months of painstakingly careful planning, high-level coordination with agencies concerned, and organization.

One source of that pride is DDC new rapid telephone search service, designed to service users in the areas of biological warfare, bionics, chemical rocket propulsion systems, masers, microbiology, physical oceanography, radiobiology, refractory metals, semiconductor devices, UV and IR detection.

Usually, the search can be completed in any of the areas and the desired information furnished the user within an hour by return telephone call. Documents and cards desired are mailed within 24 hours.

A DDC inauguration briefing brochure described the new facilities in detail, offering some interesting statistics in the process, such as the statement that microfilm used to record documents for storage would, in a normal year, reach from Washington, D.C., to Albuquerque, N. Mex.

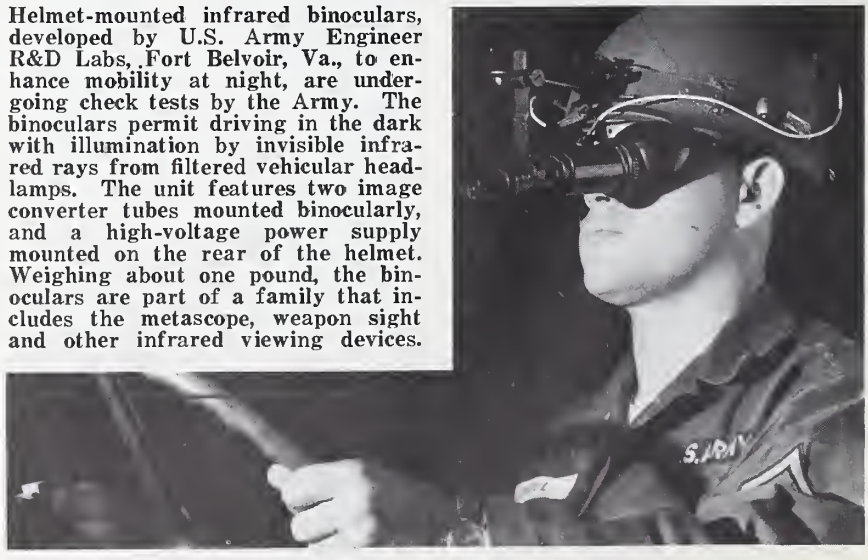
Army Warfare Vision Chief Elected Fellow of IES

Dr. Robert S. Wiseman, chief of the Warfare Vision Branch at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va., recently was elected a Fellow of the Illuminating Engineer Society (IES).

Dr. Wiseman has authored a number of technical papers, many of which have been published in the IES journal. The Vision Branch is responsible for the research and development of viewing equipment, which enables the soldier to fight, move, observe and work at night.

Night vision is but one of the many fields of endeavor in which the Laboratories, as an agency of the U.S. Army Mobility Command (MOCOM), are contributing to the modernization of the Army.

Employed at the Laboratories since 1954, he received all of his degrees from the University of Illinois. He served in the Air Corps in World War II and is presently a major in the Reserves. From 1948 to 1951, he established and taught the illuminating engineering option of electrical engineering at Mississippi State.



Helmet-mounted infrared binoculars, developed by U.S. Army Engineer R&D Labs, Fort Belvoir, Va., to enhance mobility at night, are undergoing check tests by the Army. The binoculars permit driving in the dark with illumination by invisible infrared rays from filtered vehicular headlamps. The unit features two image converter tubes mounted binocularly, and a high-voltage power supply mounted on the rear of the helmet. Weighing about one pound, the binoculars are part of a family that includes the metascope, weapon sight and other infrared viewing devices.

Kudos

Lt Col Ludwig G. Kempe, assistant chief of the Neurosurgery Department at Walter Reed General Hospital (WRGH), recently received the "A" prefix rating, the highest awarded by the Army Surgeon General for noteworthy contributions in a specialized field.

Meritorious Civilian Service Awards, the Army's second highest civilian honor, were presented to three branch chiefs of the Armed Forces Institute of Pathology, Dr. Lent C. Johnson, Dr. F. K. Mostofi and Dr. G. H. Klinck.

A joint award was presented to a team of Army and civilian personnel for their exhibit at the 1963 American Medical Association convention, namely: Lt Col Kevin G. Barry, MC, chief, Department of Metabolism; Capt Richard I. Mazze, MC, Walter Reed General Hospital; Dr. Antonio Boba, Albany Medical College of Union University; and Dr. Samuel R. Powers, Jr., chief, Department of Experimental Surgery at Albany Medical College.

For research and application of material printed in the American Industrial Hygiene Association's first *Respiratory Protection Devices Manual*, Allan L. West, chief of the U.S. Army Chemical Research and Development Labs, was highly commended.

Ceremonies marking the first anniversary of the U.S. Army Mobility Command Engineer and Research and Development Laboratories were featured by presentation of Department of the Army certificates and pins to employees with long Federal service standing.

Maj Gen Alden K. Sibley, CG of the Mobility Command, presented the 30-year awards and Col J. H. Kerkering, Laboratories CO, presented the 10 and 20-year awards.

Winners of 30-year awards include James E. Wideman, Arthur Berreth, Dale I. Albright and Forrest B. Kimbell.

Twenty-year awards were made to: Edward M. Lloyd, Guy M. Moose, John Thomas, Charles Thomas, Robert D. Lawhorne, Gerard G. Hansen, George A. Hinkle, Leo R. Croisetiere, Robert J. White, Max P. Whitford, Mrs. C. Ruth Hereford, Robert C. Robinson, Ross D. Figard, William H. Baer, Alexander L. White, Judson M. Thurston, Ralph E. Fravel;

Also, William S. Guerrant, Theodoric B. Edwards, William F. Clark, Vincent A. Lee, George L. Deane, Warren E. Limerick, Norman T. Snellins, Emory G. Thomas, Dennis W. Griffin, Baney R. Dye, Julian E. Leysath, Donald H. Johnson, Mrs. Grace R. Slater, Carl S. Pate, John H. Hopkins, Lawrence E. Folk, Samuel W. Simmons, George H. Frazier, Jr.;

Also, Clarence H. Hendricks, Joseph Saunders, Plomer J. Williams, Clarence E. Adams, Robert West, Mrs. Susanne Collier, Roland E. Rodgers, Eugene S. Plowe, Elzie M. Carter, James Partridge, Hermann Jacob, Emil C. Wilson, Roy V. Nowry, Alan P. Bradford, Myron W. Klein, Harlan A. Strothers, Wilbur L. Jarvis, John E. Lee, Jr., Donald J. Looft, Edward Prada, James L. Allen;

Also, Charles H. Hickman, Chester R. Gurski, Noel C. Brown, Stuart C. Rand, Edward K. Collins, Louis R. Ritzer, Ralph E. Armbruster, Charles T. Shipley, Jack R. Grimm, Gilbert G. Hedges, Charles W. Denn, Calvin O. O'Rourke, Wilfred W. Davis, Joseph Finberg and Mrs. Julia S. Rice.

Ten-year pins were presented to James K. Knaell, Allen O. Elkins, George E. Mather, Llewellyn T. Mitchell, James T. Watson, Durald C. Frink, Richard R. Rogowski, Thomas C. Moris, George C. Ashley, Milton E. Foxwell, William W. McGeorge Jr., Ronald Bernstein, Lonnie D. Gaddy, Jr., Ernest A. Meredith, Arthur B. Hook, Arthur C. Dauray, Richard S. Medding;

Also, Robert F. Thompson, Richard P. Bliss, Howard E. Churchill, Kenneth D. Robertson, Myrain Y. Harvey, Ewing O. Davis, Elijah Upshaw Jr., Curtis G. Crom, James H. Cox, John Morgan Jr., Reuben Kale, Charles Bush, Mrs. Katie J. Guinn, Mrs. Evelyn L. McDonald, Mrs. Florence E. Olson, Albert J. Olson, Eugene Hartless, William Wooten.

WSMR Electronics Engineer Awarded SA Fellowship

The first Secretary of the Army Research and Study Fellowship awarded at White Sands (N. Mex.) Missile Range has been won by a young electronics engineer of the U.S. Army Electronics Research and Development Activity.

Robert H. Paul, 36-year-old chief of the Electronics Tracking Division of the Instrumentation Department of the Army Electronics R&D Activity, will receive full salary, tuition, books, and other expenses for a year of graduate study at New Mexico State University.

With Dr. Otto Theimer, research professor of physics at NMSU, he will work in the development of Laser (light amplification by stimulated emission of radiation) devices for the detection and tracking of missiles and satellites.

The fellowship grant was arranged by Homer Scott of the Employee Development Branch of the Civilian Personnel Office at White Sands Missile Range and presented by Col William G. Skinner, commanding officer of the Electronics R&D Activity.

Paul received a masters degree in electronics engineering in 1955 from New Mexico State University and was granted nine months of graduate study there from 1959 to 1960.

Employed at White Sands since 1951, he worked with the Range Instrumentation Development Division before his transfer in 1962 to the Army Electronics R&D Activity.

Robert H. Paul

ARO Plans Officer Teaching Democracy Course at Seminary

Dr. Thomas Adams, research plans officer at the U.S. Army Research Office, is teaching an evening course entitled "Current and Historic Issues in American Democracy" at the Virginia Theological Seminary, a branch of the University of Virginia.

Lectures are on famous speeches and documents. Dr. Adams also analyzes the viewpoints of two American publications, *The New Republic* and *U.S. News and World Report.*

After earning his B.A. degree in political science from Pennsylvania University, he received an M.A. in that field from the University of Oklahoma and a Ph. D. in international relations from Oklahoma. He also has a B.A. degree in Spanish from the University of Madrid.

AMRA Sets Up Nondestructive Testing Info Service

The Army Materials Research Agency (AMRA) at Watertown (Mass.) Arsenal has established a Nondestructive Testing Information Service. Its mission is to collect, evaluate, abstract, index and disseminate testing information.

Supervised by one of the eight scientists and engineers of the Nondestructive Testing Branch, Metals and Ceramics Research Laboratories, the Service is operated by one full-time clerk. Presently it references about 2,000 papers and articles dealing with nondestructive testing. Branch personnel "feed" the system as part of routine research work.

Need for the system became increasingly apparent in recent years to AMRA scientists. News of domestic and foreign military and industrial advances in the comparatively new science underlined the Economy of Force principle of war.

To utilize efficiency the available scientific manpower, it was obviously necessary to emphasize the advance of the state-of-the-art and to preclude, or at least minimize, duplication of the work of others excepting possibly the evaulation of earlier findings, by establishing a centralized information source.

A commercial coordinate indexing system, originally developed at the National Bureau of Standards, was selected for its simplicity of encoding and speed in retrieval. Briefly, the retrieval system consists of a set of descriptor cards, one set for each subcategory of nondestructive testing. Each paper may be indexed under a number of different descriptors. The index capacity of the system for one set of descriptor cards is 10,000 papers, and additional sets can be added as required.

By overlaying descriptor cards on an illuminated readout device, the desired documents can be identified by reading the coordinates of the holes through which the light appears. It is estimated that 10,000 items can be searched in less than five minutes using this system.

Items in the system are collected from AMRA's reports acquisition lists, Defense Documentation Center (formerly ASTIA) bulletins, NASA technical publications lists, periodicals, commercial indexing facilities, and houses specializing in translations of foreign technical reports.

The items are routed to the branch scientist to whose discipline they are most closely related. Even without the system, this would be normal procedure in the interest of the professionals keeping abreast of their technical literature.

To "feed" the system, those men now evaluate each paper, write a brief abstract if the paper has merit, and list appropriate descriptor card numbers for punch-coding.

All phases of nondestructive testing are referenced in the system, and provision has been made for inclusions of new methods as they are developed. At present, most papers are in the fields of radiology, ultrasonics, electromagnetics, magnetic particle and infrared testing.

Information is disseminated via a newsletter distributed to interested personnel throughout the Department of Defense. Published as often as the volume of news warrants, it highlights new developments in nondestructive testing, important publications, standards and specifications, new equipment and instrumentation, news of meetings and personnel notes. Contributions are invited from all DoD facilities and Defense contractors having information to disseminate.

Written requests to be placed on distribution for the newsletter and all correspondence are to be addressed to: Army Materials Research Agency, ATTN: Nondestructive Testing Information Service, Watertown 72, Mass.

Miniature Launcher Tests Little John Spin Drive

By Niel M. Johnson
Rock Island Arsenal

The Research and Development Division of Rock Island (Ill.) Arsenal, U.S. Army Weapons Command, has devised a novel technique for determining the influence of the Little John rocket-launcher's spin drive "interconnect" upon the accuracy of rocket launch.

A test set-up was made in which a reinforced dummy Little John rocket is accelerated at a launching beam for 2½ inches at the same rate as an actual fired rocket. Accelerated by a pneumatic ram, the rocket is stopped by hitting the muzzle end of a 75 mm. pack howitzer which recoils on impact, thereby absorbing the load without damage.

The behavior of the rocket and launcher is traced by a high-speed oscillograph. From this data the entire period of guidance on the launching beam is predicated by use of an analogue computer.

The experiment is believed to be the first in which a large caliber free-flight rocket has been propelled at actual firing accelerations within the laboratory. The objective is to determine what, if any, influence the shaft which spins the rocket may have on the launching beam that would adversely affect accuracy.

Specifically, the Arsenal has attempted to determine if varying the number of winds of the spring-powered motor, or changing the length of the shaft's engagement with the rocket, will result in erratic or inconsistent motions of the launching beam as the rocket leaves the launcher.

Considerable data has been gained, and although a final evaluation is yet to be made, the evidence indicates that the effects of the spin shaft are consistently "reproducible" and therefore would not account for any significant deviations in accuracy.

XM34, 318 mm. Rocket Launcher
SOSR Spring Motor Drive, Inter-Connect Shaft Reaction Test

Ingenuity Cuts Cost of Redstone Missile Research

Aeronautical engineers Joe Byrd and Jim Williams follow flow of water on a test table at the Army Missile Command's Inertial Guidance and Control Laboratory to study air flow related to advanced missile control theories.

Plain tap water, a dash of green food coloring and ingenuity are providing scientists with economical answers to some puzzling air flow control questions at the U.S. Army Missile Command, Redstone Arsenal, Ala.

Conceived when Joe Byrd and Jim Williams wrote specifications for a special water table designed to test missile control theories, the mixture is producing remarkable results.

The two aeronautical research engineers in the Missile Command's Inertial Guidance and Control Laboratory are working toward a missile control system without any moving parts. They believe a great deal can be learned about the flow of air by studying the behavior of water, which reacts similarly to air flow controls and pressure.

Since it is financially unfeasible to fly a missile each time an engineer wants to test a control technique, the water table technique is proving one of the most economical means yet devised to evaluate theory.

Tanks at each end of the table serve as reservoirs. A couple of feet from where the water is pumped onto the table, the young engineers carefully place brass models or strips of heavy plastic to hold the water with a sort of miniature dam. For a "spillway," they leave a small opening in the dam and place fluid control wedges into its mouth to direct the flow of water.

By moving the models, they can create along a 17-foot test bed any number of complicated situations which fluild flow is likely to encounter. By analogy and mathematical process, they can determine how air would have reacted in the same situation. About 1,100 gallons of water are required to operate the table, with a variable flow rate of 0 to 49.6 gallons per minute.

Results conceivably could be incorporated into missile control components and systems actuated by hot gases or compressed air.

Williams and Byrd, both graduates of North Carolina State College with degrees in mechanical engineering, believe there are probably less than 20 places in the United States where theories about pure fluid control systems are being evaluated. Pioneering research and development work in this field was done and is being continued at the Army's Harry Diamond Laboratories, Washington, D.C.

Walter B. Paluchowski, Jr. (left), a 14th National Science Fair-International Army award winner from Wilkes Barre, Pa., discusses military mapping systems with John C. Kerkering during a recent 3-day visit to the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va. Paluchowski's project, "Mapping the Invisible Universe," was 1 of 20 receiving awards for summer jobs or visits to Army laboratories. (See June-July issue for details.) Kerkering, a graduate student at Notre Dame University, was summer employee of GIMRADA.

McNamara's Cost Policy To Highlight AFMA Meet

Secretary of Defense Robert S. McNamara's new policy on profits and cost cutting in Defense contracts will be a principal subject covered at the National Conference of the Armed Forces Management Association in San Antonio, Tex., Oct. 29-31.

Defense Profit Motivation and Cost Reduction will be the topic of a major address by B. J. Hansen, vice president of Computer Dynamics Corp. and former Office of the Secretary of Defense consultant.

The speech will disclose a new use of the widely publicized PERT management system called, "PROFIT PERT," Rear Adm T. B. Neblett, USN, Ret., of the Armed Forces Management Association executive office, has announced.

The PROFIT PERT concept will introduce fee and profit prediction, estimating, and monitoring to defense industry. The concept concerns a system for business to manage contracts using profit motivation. It would work so that defined costs, time and performance measures developed by PERT on incentive contracts could be used to measure profits.

The conference theme, selected by the Association, is "New Frontiers in Defense Management." Other experts in this area from Government, industry and educational institutions will talk on cost and profit improvement to inform military managers and their industrial counterparts.

Army Missile Command Pushes Program of Graduate Education

By Dr. William W. Carter

A recently signed $312,350 contract between the U.S. Army Missile Support Command and the University of Alabama adds another chapter to the story about a college campus that came to the Army.

When the Army's fast-moving missile and space industry located at Redstone Arsenal in North Alabama's Tennessee Valley, there were so many new developments almost daily that missilemen were hard pressed to keep up.

To fulfill assigned missions, the Army had to make certain that personnel were continuantly informed in the latest techniques in all fields related to missiles. How to do this was the problem.

The first solution came through the Civilian Personnel Office at Redstone Arsenal. Special technical courses covering problem areas were organized in November 1952. The program was known as Redstone Graduate Institute and faculty members were drawn from the pool of outstanding scientists already working for the Army.

This school was successful, but limited. Scheduling had to be during regular working hours. Students enrolled in any of the courses had to take time off from their jobs. Expansion of the Army's mission in the missile world increased demand for attendance at these classes and for additional courses.

Another problem of greater concern was the requirement to bring large numbers of young engineers, scientists and technical personnel into Redstone Arsenal's rapidly growing laboratory and testing facilities. Acutely aware of the need to increase their knowledge of missilery and space, the Army realized that its Institute was assuming major proportions.

For help in education, the Army took its problem to the University of Alabama, about 174 miles south of Huntsville and Redstone Arsenal.

"Could the University, working with the Army, provide advanced technical courses as part of its extension program?"

The University agreed in 1955 to establish a graduate level program in addition to its undergraduate extension center already operating in Huntsville. Because the University had no facilities in the rocket center —the undergraduate program was being conducted at night in a city school—the Army agreed that the graduate courses could be taught in its Arsenal classrooms, also at night.

GRADUATE STUDY STEERING COMMITTEE directing Army and NASA graduate study program at Redstone. Appointees from the Army Missile Command, Army Ordnance Guided Missile School and Marshall Space Flight Center, they are (seated, left to right) Dr. Marvin J. Hall, MICOM; Dr. J. B. Dozier, Committee Chairman Dr. William R. Lucas, Charles L. Bradshaw and Dr. Rudolf Decher, all MSFC. Standing, left to right, are James F. Dowdy, MSFC; H. A. Heithecker, Dr. William L. Alford, John P. Hallowes, Jack H. Hardin, all MICOM; Dr. Preston T. Farish, MSFC; John S. Hinkle, MICOM.

Under terms of the contract, renegotiated annually, the University establishes graduate level courses as requested by the Army. When a supervisor feels that one of his workers could perform his job better with additional instruction in a certain technical course or courses, he certifies this to top management.

If management recognizes that the Government would benefit, and if the individual is qualified for the graduate level work, his enrollment may be sponsored by the Army and paid for under terms of the contract.

Interesting and important facets evolved in establishing the Graduate Study Program, as the cooperative venture became known. Under University of Alabama sponsorship, holders of regular engineering degrees from other colleges and universities could take advanced courses credited toward higher degrees.

An incentive was thus provided to many top-notch young engineers to come to Redstone, because they could advance themselves in scientific knowledge under an established college program while carrying on with their regular workload.

The break-away of space missions from the Army, and subsequent establishment of the National Aeronautics and Space Administration's Marshall Space Flight Center at Redstone Arsenal, added impetus to growth of both the University's undergraduate and graduate programs in Huntsville.

The Army Missile Command was joined by the George C. Marshall Space Flight Center in establishing a Graduate Study Steering Committee with members appointed from each as the program advisory body.

The Army Missile Support Command is the contracting office for students taking graduate courses under Government sponsorship. The University of Alabama provides administrative and resident faculty support.

Because of the faculty shortage on the main campus, however, the Huntsville center draws part-time teachers from highly qualified business, professional and technical leaders of the area, many of them nationally recognized engineers employed at Redstone.

In 1961 a 60,000-square foot University of Alabama Huntsville Extension Center building was constructed. This, too, became a cooperative affair, with two-thirds of the cost of the $720,000 building being provided by the City of Huntsville and Madison County, along with an additional donation of 83 acres of land valued at $166,000.

Growth of the Graduate Study Program is best pictured in expansion of the courses offered and the number of enrollments.

During the fiscal year 1955-56, a total of nine courses was offered at request of the Army. By 1961-62, this had expanded to 64 and 100 courses are anticipated for 1963-64.

In 1956-57, there were 126 annual registrations in the graduate program. By 1962-63, this had grown to 1,027 enrollments, and officials are anticipating about 1,300 during the '63-'64 University term. These include enrollments by federally sponsored students and those from contractors for Arsenal projects.

A number of contractor employees are able to take these advanced courses to complement knowledge of their Army counterparts. Some of these students are employer sponsored and some enroll on their own. Either way, however, the end result is a more knowledgeable technician.

As a result of the new contract, the University's Huntsville Center will make available additional graduate level courses which can lead a student to a master of science degree in certain technical fields. The Huntsville Center is the only one in the University's state-wide system offering a graduate degree without on-campus classes.

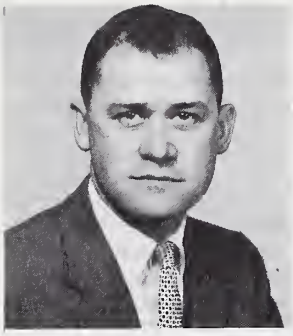
Alabama's citizens have recognized the importance of this educational program by voting a $3 million bond issue to construct facilities for a Research Institute to be located at Huntsville. In the new building, now under construction, basic research will be done on contract to the Government and private industry.

The Research Institute will bring to Huntsville a full-time faculty composed of top academic research scientists, providing a nucleus for facilities to which the Government can turn for pure research. These scientist-teachers then can instruct Government engineers and scientists in the knowledge they need to do a better job for the various elements at Redstone Arsenal.

The cooperative arrangement between Federal scientific and engineering installations and the University's Research Institute and Graduate Program is in line with recommendations made in 1960 by the President's Science Advisory Committee.

Interesting to note is that the Graduate Study Program is one of the largest centers for advanced scientific and engineering education in the South. Originated as an effort to improve the scientific and engineering operations of the various elements in the Redstone Arsenal complex, its influence is spreading beyond the fence-enclosed boundaries.

Almost all industrial life in Huntsville is dependent directly on Redstone Arsenal. Improved academic climate will bring a diversity of industrial development which will favorably influence the regional availability of contractor support to the Federal agencies at Redstone.



Dr. William Walton Carter is chief scientist of the U.S. Army Ordnance Missile Command at Redstone Arsenal, Ala., which is responsible for research and development, procurement and support of all Army missiles.

Born in Pensacola, Fla., Nov. 7, 1921, he attended grammar and high school at Fort Worth, Tex. He received his B.S. degree in physics in 1943 from Carnegie Institute of Technology, his M.S. in physics in 1948 from California Institute of Technology, and his Ph. D. in physics in 1949 from California Tech.

CRDL Employee Commended For Work on AIHA Manual

Allan L. West, an employee of the U.S. Army Chemical Research and Development Laboratories (CRDL), Edgewood Arsenal, Md., has been commended by the American Industrial Hygiene Association.

The citation acclaims his contributions to the Association's first Respiratory Protective Devices Manual. As chief of CRDL's Physical Protection Division, he reviewed and submitted revisions for several chapters of the manual prior to its publication.

The manual is expected to be of immense value in industrial applications, since it contains much information urgently needed and heretofore not readily available.

Preparation of the manual began in 1958 with the formation of a Respiratory Protective Devices Committee. CRDL, because of its long-term position as the only laboratory in the United States which is conducting fundamental research on respiratory protective equipment for the military, became one of the committee's prime sources of information.

Consultation with Mr. West began after he presented a paper titled "Respiratory Protective Equipment Developments by the Chemical Corps" at the 18th Annual AIHA meeting in 1957.

Maj Gen Stubbs Schedules Retirement October 31

Thirty-four years of distinguished military service will end for Maj Gen Marshall Stubbs Oct. 31 when he retires from the Army. Presently he is Director of CBR, Assistant Chief of Staff for Force Development.

Graduated from the United States Military Academy in 1929, he began his Army career as an Infantry officer but transferred to the Chemical Corps in 1934. Five years later he was graduated from Massachusetts Institute of Technology with an M.S. degree in chemical engineering.

Assigned as commander of the U.S. Army Rocky Mountain Chemical Arsenal at Denver, Colo., in 1942, he went to Europe in 1943 and served during the remainder of World War II as a chemical officer and later as assistant chief of staff, G-4.

After a 3-year tour at the Army Chemical Center, Md., in the Research and Engineering Division, he was graduated from the National War College in 1951. Duty followed as chief of R&D Division, Office of the Chief Chemical Officer, until in 1954 he became commander and later CG of the U.S. Army Chemical Corps Materiel Command.

Subsequent assignments included CG of the Army Chemical Center and the Chemical Corps Materiel Command, and later of the 1st Logistical Command at Fort Bragg, N.C. He was promoted to major general in September 1958 and assigned as Chief Chemical Officer.

Maj Gen Marshall Stubbs

Optic Field Suffering From Decline of Research, Teaching

By Ernest R. Rechel,
Consultant, Frankford Arsenal

A peculiar circumstance governs the field of optics in this country. In spite of growing demands for new applications, there is a decline in teaching and research.

Advances in technology and the research discoveries of the past few decades have been largely ignored in optics, even though by exploiting them we might have achieved important advances in applied optics. Further, theoretical optics has diffused into many other scientific disciplines and is difficult to separate from the rest of physics, or even chemistry, physiology and space engineering.

In 1959 the American Ordnance Association surveyed the optics industry on the question of research opportunities for developing new refracting media. The response seemed to say that applied optics could indeed benefit by exploiting new advances in science and technology.

Two years later, the Optical Society of America received two reports from its membership on the need to enlarge the Nation's research activity in optics. One proposed a National Institute of Optics, along the line of similar institutes in other countries, while the other dealt with the educational problem.

Both reports have been digested by a special task force of the Society and recommendations were published in the *Journal of the Optical Society of America*, June 1963.

In late 1961, concurrent with the activity of the Optical Society, the U.S. Army Research Office (USARO) contacted Army agencies, universities and industrial laboratories in order to organize a conference on optical research for Army needs.

The conference was held at the USARO-Durham, N.C., office in May 1962, and the proceedings showed specific areas where outstanding exploratory work had been done and was awaiting application.

Conference conclusions were presented to the Army Materials Advisory Committee. Then a research plan was prepared for the next 10 years of sufficient scope to cover long- and short-range objectives, in both basic and applied research.

The plan reflects the concensus of the Durham conference that the Army needs a strong in-service competence in optics, that this competence is not now adequate, and that it will require five years to develop it.

It is worth reflecting on how well it complements the efforts of the Optical Society of America by providing much of the research support necessary to their educational concerns. The following paragraphs summarize eight of the research topics that have immediate interest and strong promise of major advances in applied optics.

Vapor Deposition of Glass. Surface finishes are quite commonly deposited from the vapor phase, and in some instances massive materials have been built up. This is now a routine technology and certainly lends itself to special glassy structures. There are many glass formulations we would like to study which are impossible to make by melting because of mutual insolubility of the ingredients. They have, therefore, remained untried and are of theoretical interest only.

The technique of vapor deposition, however, enables us to condense mutually insoluble materials, molecule by molecule, so that in effect we force them into a state of psuedo-solution. Perhaps, even crystalline materials not heretofore considered for glass can be embodied in these new refractive media.

Glass from Desiccated Gels. The suggestion to make glass from gels was advanced by Dr. Rustum Roy of Pennsylvania State University. The gels process seems to offer the same advantages as vapor deposition since insoluble materials can be dispersed as colloids and mixed to give a continuous gradation of optical properties. The colloids would normally be dispersed in water removed as the gels are changed to stable solids.

Roy's current experiments indicate an interesting alternative—that some of the water need not be removed and could become part of the glass formulation. It is even possible to add gases to the formulation, such as carbon dioxide or nitrogen, so that when the gel is consolidated a whole new family of glasses would be developed in the low range of refractive index.

Stability of Glass. The polished surfaces of prisms and lenses always degrade to some extent with exposure to the atmosphere. The degree of damage varies with the type of glass and the environment, but is especially severe with many useful formulations of such low stability they are impractical.

The cause is usually assigned to selective chemical action or solution with atmospheric constituents. But a new theory is now current that suggests micro-scale electrochemical phenomena might be a factor. We know there are minute variations in composition from point to point within glass. If we should take the trouble to produce "super-homogeneous" glass, we could test the elec-

Army Materiel Command Long-Range R&D Planning

(Continued from page 2)

be defined. The plan will be modified periodically in order to reflect needed changes in objectives and technical capabilities.

Information on the total effect of each change is produced and demonstrated in a manner to permit the decision-maker to consider all feasible alternative courses of action.

From the plan, it is possible to determine the alternatives from which the annual program for any number of years can be selected. The long-range task plan for individual laboratories can be specified as a basis for their own planning of the most effective utilization of resources, and for the creation of research groups with the necessary skill to accomplish the tasks in the plan. The plan is also responsive to changes in resources, technology or other factors requiring program changes.

The hazard in any planning of innovative activity is that the plan will become an end in itself rather than a means for the most effective utilization of resources to achieve objectives. It is our intent that the major input to the overall plan will be from the laboratories and the field. Also, we intend to provide for some tasks or work which may not be related specifically to identified objectives, using resources to develop unforeseen opportunities.

R&D managers are alert to the need to modify our plans whenever tasks or projects are proposed which have not been included but which offer attractive alternatives to achieve technical objectives under constant review.

Within the AMC, we are fully aware that breakthroughs cannot be programed and that technical objectives will not always be met on schedule. However, no traveler should be without a map nor should an operation be mounted without the best possible plan. We feel we can plan our efforts to insure the best possible chance of reaching our objectives—that conscientious planning of R&D in detail will provide a road map into the unknown.

trochemical theory. If it were correct, we would have a clue to improving the stability of glass. In fact, this problem might well be studied as part of the two preceding projects since they are both well suited to the production of superhomogeneous glass.

Gradients in Refractive Index. The concept of variable refractive index was barely touched with the application of antireflection coatings on lenses for cameras and binoculars. This idea can be extended much further. If we should produce lenses whose index varied from center to perimeter, the curvature of the lens would be eliminated theoretically. It could certainly be greatly flattened, and we could achieve reductions in weight and space that would be important for satellite optics.

We know of at least four approaches to such unique lenses through existing techniques: hot-press powder compacts, as in powder metallurgy; ion diffusion into glasses; vapor deposition with masking devices, a varient of the first topic; or possibly vapor diffusion into solids at high temperatures.

This last idea would seem the most unlikely to succeed. Yet it is the only one tried so far, with impressive results, by Dr. Pincus of the General Electric Schenectady labs.

Laser Glasses. This field calls for intensive research on optical media that interact strongly with radiation, to such an extent that their optical properties are changed. This is a long-range basic research field where we seek finally to state the functional mechanisms of optical media and produce useful fomulations.

The useful results we can expect are exemplified by the near possibility of developing laser glasses to replace laser crystals, such as ruby, so as to realize the inherent cost advantage, not to mention reliability and ease of manufacture, for large lasers. Only a few laser glasses are known, and they still represent an infant technology. Intensive work in this field, no doubt, will provide new optical amplifiers, active filters and controlled absorbers and reflectors.

Joining Techniques. We now have special cements for joining optical elements and have come a long way from conventional Canada balsam cement. The current preference seems to be polyester type cements, but there is still a great demand for dimensional and chemical stability.

All kinds of cement, however, may be entirely ruled out with laser devices and their high flux densities. There are compelling reasons to seek an entirely new joining technique based possibly on direct molecular cohesion rather than cements.

Thin Films and Coatings. We often use transparent coatings on optical elements to decrease reflection losses, sometimes to protect against abrasion and weathering, or even to provide a degree of color correction in the case of dispersive coatings.

As in the case of cements, the advent of laser devices make conventional coatings almost useless. Even with small absorption coefficients, the heating effects are high enough to damage the film.

Although it now appears that multilayer dielectric coatings will solve this problem, they are not yet fully understood and practical, and they require a great deal more study. The techniques for putting down the layers must be developed, and we will need inspection methods to check the properties and dimensions of the structure.

Fiber Optics. Fiber optics is concerned with the wave guide transmission of light by transparent fibers, and it promises many interesting applications. A familiar fiber optics device is the flexible bundle of fibers that transmits an image from one plane to another at any orientation without lenses. For other applications, the fiber bundle may be rigidly bonded and slices cut off to form plates that transmit images. New effects in laser technology may be realized with fiber optics.

A large field is open in fiber optics to exploit these unique properties. We need glasses that are much more transparent than those we know, especially where the optical circuitry is lengthy. Many technical problems must be solved to offset diffusion between fibers, the effects of impurities, and weathering, all of which become critical with small glass fibers.

Further opportunity is suggested to imitate and improve on the natural fiber optics found in the mineral ulexite. Here we face the challenge of synthesizing the mineral, or a related composition, in batch furnace operations to yield large blocks of fiber optics at low cost.

Little doubt exists that these varied efforts will yield important results through the development of new optical media. One can expect a new array of optical properties that will greatly improve image correction and reduce weight and size.

Laser technology demands firm support for its promise of large flux densities for communications, ranging and perhaps direct assault. Certain applications of fiber optics are now well defined. With an early program of applied research, we can expect new compact modes of image transfer, remote sighting of weapons and fiber lasers.

Natick Laboratory Develops Cost-Saving Parachute Pack

Parachute packaging cost savings of $280,000 annually are envisioned by use of a 3-piece corrugated fiberboard container developed by the U.S. Army Natick (Mass.) Laboratories.

The "Chute Pak" is intended to replace the hermetically sealed metal container now used by the Armed Forces. The Department of Defense estimates the saving in purchasing, shipping and storage at about $3 a container.

Weighing seven pounds, the new pack is 22 inches long, 15½ inches wide, 11 inches deep, and is designed for easy handling and storage. Sections are folded for a friction closure and strengthened at the corners with waterproof tape, eliminating need of glue, staples or stitching wire.

Natick Laboratories officials credited the Air Force, Navy, parachute manufacturers and the fiberboard industry with close cooperation in developing the Chute Pak.

Natick specialists determined that hermetic sealing and reusable containers are not essential requirements. Findings compiled since 1954 show that chutes packed in a polyethylene bag and overpacked in a fiberboard container have sustained no degradation.

ERNEST R. RECHEL, consultant to the Research and Development Group at Frankford Arsenal, U.S. Army Munitions Command, Phila., Pa., is a native of San Antonio, Tex. A 1927 chemistry graduate of Rice Institute, he went to Frankford Arsenal as a junior chemist in 1928. There he rose to the position of director of the Chemical Research Laboratory and served in this capacity from 1945 to 1958. He then became deputy director of the Pitman-Dunn Institute for Research, serving until his retirement Nov. 30, 1962. Mr. Rechel is the holder of many patents and author of a number of scientific papers related to chemistry and optics.

Advanced Fueling Systems

By Dwight F. Hastings

QMREC, Mechanical Engineering Division

Experimental hose weighing about one-twentieth as much as tubing in current use and collapsible containers made of plastics and coated fabrics are being evaluated by the Army for dispensing bulk fuel to military forces in forward areas.

Investigations at the Quartermaster Research and Engineering Center, U.S. Army Materiel Command, Natick, Mass., are expected to yield better fuel dispensing methods than are now used where the military fuel supply function has no commercial counterpart.

The new plastic hose exhibits strength, flexibility, fuel abrasion resistance and durability for dispensing fuel to pressures under 60 p.s.i.

Because of its light weight and flexibility the hose can be used easily in larger diameters. This permits high-volume flow at low pressures and greatly reduces the frictional losses and horsepower pumping requirements. It also can be stored, transported and dispensed with minimum manpower.

These desirable features are expected to lead to a practical use for new and companion fuel system components made of plastics such as fittings, pumps, and filter-separators.

Developments are now underway on a dispensing system using the experimental hose with a lightweight, gasoline engine driving a high-volume, low-pressure pump. This system will be equipped with fittings using a new concept in flow-control-valve construction and will serve as a test vehicle for the evaluation of other valve designs and types of lightweight hose and system parts.

Ultra-lightweight containers are also being investigated as storage facilities to be used with highly mobile forward area fueling systems.

An indication of coming developments is an experimental self-supporting, 3,000-gallon-capacity plastic film container that weighs less than 35 pounds, complete with conventional hardware components. With compatible plastic fittings it would weigh even less.

An ultimate result of this development will be large-capacity fuel containers so lightweight and free of bulk that they may be handled in a suitcase or footlocker. Development of a plastic film container with a 10,000-gallon capacity is planned.

The durability factor has received extensive consideration in the experimental plastic fuel container. Experience has shown that damage occurs most often through mishandling of awkward packages. Forklift truck tines have been thrust through rubber fuel containers during careless handling and "soft" equipment is often damaged when it comes in contact with adjacent hard cargo.

Lightweight plastic hose (right), which permits high volume fuel flow at low pressure, weighs 20 times less than standard rubber hose at right.

3,000-gallon, experimental, collapsible, plastic film fuel container weighs less than 35 pounds when empty. Weight includes metal fittings.

As for hose durability, most abrasion problems relate to the handling of hose when it is heavy with fuel. To eliminate the need for heavy reels, and to minimize damage to the hose during handling, the new concept envisions the withdrawal of fuel from the hose by using a reverse-flow valve at the dispenser. This will permit folding the hose back into its tray on the dispenser when fueling operations are complete.

These new hose and container concepts have stimulated the interest of a wide segment of industry with subsequent expansion of the possibilities to be studied. With this added impetus, the Army, in the near future, expects to demonstrate a practical, ultra-lightweight fuel distribution system which, when compared with current equipment of equivalent capacity, will cost around 50 percent less and weigh about 25 percent less.

Imaginative new concepts such as these reach out beyond present fuel distribution practices to help solve the ever present problem of providing the U.S. Army with maximum mobility and quick striking capabilities in forward areas.

Armed Forces Chemical Association Elects CRDL Man

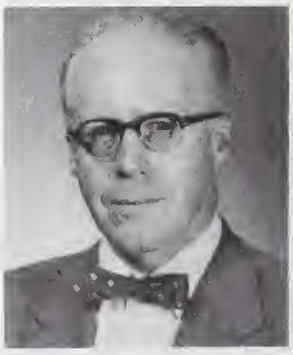
Dr. Robert L. Fox, an employee of the U.S. Army Chemical Research and Development Laboratories (CRDL) since 1946, is the newly elected vice president of the Armed Forces Chemical Association.

Since 1958 he has served as assistant to the director of medical research at CRDL and also as an assistant to the commanding general of the U.S. Army Chemical Corps Research and Engineering Command.

A charter member of the AFCA, he served in 1961-62 as vice president for programs of the Chesapeake Chapter, and the following year was Chapter president.

Dr. Fox has a B.A. degree from Upper Iowa University and M.A. and Ph. D. degrees from Columbia University. He is a member of the American Association for the Advancement of Science, American Chemical Society, Research Society of America and the Phi Lambda Upsilon and Sigma Xi fraternities.

From 1934 to 1941, Dr. Fox was professor of chemistry at Robert College, Istanbul, Turkey. Then he asisted Dr. Harold C. Urey on the Manhattan Project during the winter of 1941-42 before he was commissioned as a captain in the Chemical Warfare Service. In 1946 he was separated from the Army as a lieutenant colonel.



Dr. Robert L. Fox

Mobility Engineers Improve Sea Water Distillation Methods

By R. P. Schmitt, USAERDL

Self-contained, portable water distillation equipment for production of drinking water from the sea or highly mineralized water sources is a requirement in support of military field operations. While current Military Standard equipment is fabricated of copper and nickel alloys, aluminum promises units that are cheaper, lighter, more productive.

In the event of mobilization the requirements for nickel for missiles or aircraft will be great. A more abundant material will be needed for distillation equipment. Moreover, new concepts of military tactics emphasize transportable, lightweight equipment. Reduction in weight and increased efficiency due to improved heat transfer capability are other factors influencing the choice of aluminum over copper-nickel alloys.

The Sanitary Sciences Branch, U.S. Army Mobility Command Engineer Research and Development Laboratories, Fort Belvoir, Va., has developed a trailer-mounted, sea water distillation unit fabricated of aluminum alloys capable of producing 150 gallons per hour of distilled water for extended periods of time.

The vapor compression distillation process has been developed in support of military field operations because of its simplicity, low wastewater requirements, and superior fuel economy. It consists chiefly of four interconnected components: heat exchanger, evaporator-condenser, vapor compressor, and a gasoline engine.

The sea-water intake passes through a plate type heat exchanger. There it is heated by the out-going distilled water and brine streams. The sea water then passes through an engine water cooler, picks up the heat from exhaust gas and coolant water, and continues into the evaporator-condenser. There it boils at atmospheric pressure.

The evaporator-condenser is a vertical-tube, thermal-circulation unit consisting of 604 tubes, each ¾ inch in diameter, which provides 280 square feet of heating surface. Vapor produced by the boiling passes into the vapor compressor, belt driven by the gasoline engine which essentially converts mechanical energy into thermal energy.

The initial heat to start boiling is obtained from engine exhaust gases and coolant water. Thereafter this source is used only to replace heat lost by unbalanced water temperatures, radiation and conduction. Compression a few pounds per square inch increases the temperature of the vapor (steam), which is returned to the condenser section. There it condenses at a temperature somewhat higher than the boiling point of the sea water.

The latent heat of vaporization given up by the steam when it condenses stimulates continued boiling in the evaporation section. The hot condensate is pumped from the condenser section through the feed water heat exchanger and becomes the product water.

During a combined engineer-service test the unit was operated on full-strength sea water at Daytona Beach, Fla., for 1,000 hours. (See August 1962 *Army R&D Newsmagazine*, p. 14.) The average production rate was 145 gallons per hour and one pound of gasoline was consumed for each 150 pounds distilled water produced. Experience with this unit, and an earlier prototype unit which underwent 2,400 hours of sea-water testing, proved that aluminum can be used in this corrosive environment.

Extra usefulness of the distillation unit to the U.S. Army field water supply system was shown in a series of tests with seven different chemical agents of importance in the Army's chemical program. Fresh and saline water, which had been purposely contaminated, was used in the tests.

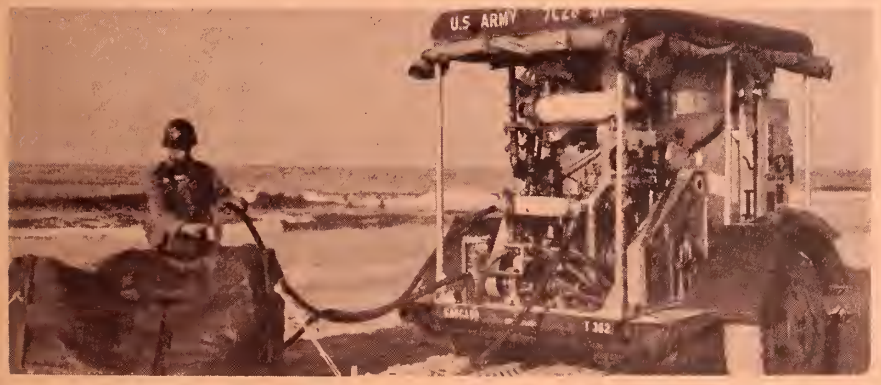
Helicopter air-lifts distillation unit from trailer to field operation site.

The distillation unit in some cases produced an agent-free distillate or one with an agent concentration so low the water was considered safe for drinking. In other cases, although a large reduction in CW agent concentration was achieved, the distillate required further treatment to produce potable water. Carbon and ion exchange resins were found effective for this treatment. In all tests safe drinking water was produced by distillation alone or in combination with carbon or resin column treatment.

Engineers at the Sanitary Sciences Branch of the Laboratories are gratified with results of the tests. They said an inexpensive, disposable cartridge could be developed for in-line distillate treatment to insure safe drinking water from sources highly contaminated with CW agents.

In addition to testing the distillation unit for the removal of CW agents from water, studies also were made of vapor hazards to the operator of the equipment, and of existing kits for determining the agents that might be found in water.

Minor changes have been made to increase the capacity to 150 g.p.h. The experimental trailer-mounted unit weighs 5,535 pounds complete, or 3,200 pounds as a skid-mounted unit. As a skid-mounted unit, it has been picked up successfully at a sea water site as a sling load by a H-34 helicopter and delivered to a location for operation. The unit is lighter, has greater capacity, and costs less than sea water distillation equipment covered by current specifications.



Sea Water Distillation Unit during 1,000-hour test at Daytona Beach.

275 Industry Leaders Attend Briefing on Army CIDS Program

Expenditure of more than $1.1 billion annually on R&D in the U.S. on chemicals, pharmaceuticals and allied products points to need for a united governmental-industry effort to achieve maximum benefit of information processes.

Walter M. Carlson, Director of Technical Information for the Department of Defense, carried that message to some 275 industrial representatives at the Sept. 17 briefing on the Army Chemical Information Data System (CIDS).

Greetings from Secretary of Defense Robert S. McNamara and from Director of Defense Research and Engineering Dr. Harold Brown were conveyed by Mr. Carlson.

Maj Gen George W. Power, Deputy Chief of Research and Development, gave the welcoming address at the meeting, sponsored by the Scientific and Technical Information Division, U.S. Army Research Office. Director of Army Technical Information, Col Andrew A. Aines, presided.

While the primary purpose of the briefiing was to acquaint industry with what the Army is doing and planning to achieve in chemical information collection, processing, storage and dissemination, its secondary aim was perhaps more important—to invite industry to suggest ways and means and to cooperate effectively toward improved use objectives.

One of the highlights of the meeting was a demonstration of the Army Chemical Typewriter (ACT) developed by a research team at Walter Reed Army Institute of Research in Washington, D.C.

Two giant television screens were used to project images of the typist encoding chemical formulas and to show how rapidly requests for information might be provided, at an estimated cost of about 25 cents each. Dr. David Jacobus, chief of the WRAIR developmental team, and Alfred Feldman, who conceived the principle of ACT, gave briefings.

WAC Sp/5 Edna Lewis tries Army's Chemical Typewriter during briefing.

Defense Director of Technical Information Walter M. Carlson (L. to R.), Maj Gen George W. Power, Deputy Chief of R&D, Col Andrew A. Aines, Director of Army Technical Information, and Deputy Director Peppino N. Vlannes hold informal chat at CIDS briefing. Dr. D. Jacobus is in background.

Emphasis of both Mr. Carlson and Col Aines was on a forthright appeal to industry to join with the Army, the American Chemical Society, the American Institute of Chemical Engineers, and other Government agencies to implement an integrated chemical information system that will produce desired results.

Without the strong support of industry, professional chemical organizations and other governmental organizations, the Army effort cannot achieve overall objectives, no matter how intensive, well planned and well executed the problem-solving approach may be, it was stated.

The appeal he was making for a united assault on the problem, Mr. Carlson said, was backed by viewpoints acquired during 23 years with industry in the chemical field as compared to 9 months in his present job.

In his presentation Mr. Carlson reviewed the activities of other governmental agencies to improve chemical information data processing and use as part of the overall assault on the scientific and technical information problem. He explained the roles of the President's Scientific Advisory Committee (PSAC), the President's Committee on Scientific Information (COSI), the Department of Defense and other governmental agencies.

"One of my first duties when I assumed by current assignment last February," Mr. Carlson said, "was to evaluate the Army's proposed program. It was clearly evident that this program deserved the full support of the entire Department of Defense, and the Army was officially requested to go ahead. . . .

"In fact, emergency funds were assigned from last year's Department of Defense budget to give the Army ample financial support for prompt action. From this response, I am sure that you will recognize that my office considers the overall Army program to be highly satisfactory, and a model to be studied closely by the other military departments. . . .

"In summary, the Army and DoD need a strong chemical information system at the earliest possible date. The Department of Defense expects to make the benefits of this [CIDS] Program available to all."

In his portion of the briefing, Col Aines explained in detail the historical background and the development of the Army STINFO (Scientific and Technical Information) Program, and its relationship to correlated and coordinated activities of other agencies monitored through Mr. Carlson.

Close coordination is maintained with the other military departments, the Defense Documentation Center (DDC), National Academy of Sciences Science Information Exchange (SIE), National Science Foundation, National Bureau of Standards, Atomic Energy Commission, U.S. Patent Office, National Aeronautics and Space Administration, and the Library of Congress-NSF sponsored National Referral Center for Science and Technology.

An explanation of the five major phases of the CIDS program and the groups to which each portion is assigned was given by Peppino N. Vlannes, deputy of Col Aines. Each phase was outlined in detail with respect to purpose, the manner in which it is to be accomplished, and how it will be integrated into the schedule of the complete program.